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ENTREPRENEURSHIP, FIRM ENTRY, AND THE TAXATION OF CORPORATE INCOME: EVIDENCE FROM EUROPE

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Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe

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Abstract

Can tax policy foster the creation of new companies? To answer this question, we assemble a novel country-industry level panel database with data on entry (by incorporation) for 17 European countries between 1997 and 2004. Our analysis is based on recent models of how corporate taxation affects firm's incorporation decision, We compute effective average tax rates and study how the taxation of corporate income affects entry rates at the country-industry level. Drawing on the political economy literature, we account for the possible endogeneity of taxation. We find a significant negative effect of corporate income taxation on entry rates. The effect is concave and suggests that tax reductions affect entry rates only below a certain threshold tax level. We also find that a reduction in corporate tax rates is more effective in countries with better institutional infrastructure. Our results are robust to alternative measures of effective taxation and to the use of alternative and additional explanatory variables.

JEL CODES: C23, H32, L51, M13.

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1 Introduction

The creation of new companies by entrepreneurs who seek to profit from exploiting business opportunities is a fundamental force for economic growth. This process, first identified by Schumpeter (1911, 1942) and formalized by Aghion and Howitt (1992), has been documented since Hause and du Rietz (1984).

Economic policies aimed at fostering the entry of new companies are high on many governments' agenda for their potential benefits for innovation, competition, employment, and growth (see Aghion and Howitt (2006)). Several recent studies have looked at this issue from a variety of angles, exploiting the increasing availability of firm-level data to assess the impact of different economic policies on entry and economic activity.[1] This literature focuses on the effects of labor, credit, and product market regulations on entry and on the characteristics of entrants and incumbents.

We fill a clear gap in this literature by looking at a policy instrument that has received surprisingly little attention so far: corporate income taxation. Taxation is a flexible policy instrument as it can be modified relatively easily in the budget law. It is also easier to change tax rates than to embark in a structural reform of labor or product markets, both in terms of legislative approval and of bureaucratic implementation. Moreover, tax reductions can provide substantial monetary benefits that may have a material effect on entrepreneurial decisions.

Our study is motivated by the theoretical model of Cullen and Gordon (2007), who suggest that corporate income taxation affects the incorporation decision through three (potentially countervailing) channels, whose net outcome is not a priori clear, neither in terms of size nor in terms of functional form. Moreover, theoretical models that account for strategic and general equilibrium effects also suggests that the taxation of corporate income should deter entry. We then build our effective corporate income tax measures using the methodology of Devereux and Griffith (1998a,b). We study the effect of corporate taxation on entry rates in a panel data setting, exploiting the longitudinal variation in the data and controlling for other time-varying institutional and regulatory factors. Our approach allows to overcome the well-known weaknesses of purely cross-sectional studies, thus providing a more solid foundation to our conclusions.

An important and novel contribution of this paper is that we consider that taxation is unlikely to be an exogenous policy instrument, but that it rather reacts to current (or past) business conditions. We account for this source of endogeneity by using several instrumental variables borrowed by the political economy literature (see Pagano and Volpin

[1] See Aghion et al. (2009), Alesina et al. (2005), Bertrand and Kramarz (2002), Bertrand, Schoar, and Thesmar (2007), Giannetti and Ongena (2009), Griffith, Harrison and Macartney (2007), Nicoletti and Scarpetta (2003).

(2005)). While some recent studies include taxation as a determinant of the incorporation decision (see Barrios et. al (2008), Djankov et al. (2008), and Klapper, Laeven, and Rajan (2006)), to the best of our knowledge our study is the first to take into account the endogeneity of tax policy in this context. Moreover, we consider that the entry decision is likely to be influenced not only by taxation but also by other policy measures. For this purpose, we include in the analysis a summary measure of other economic policies which are likely to influence the creation of new businesses, and we consider that this, too, is potentially endogenous.

Our empirical investigation therefore advances in several dimension the recent strand of purely cross-country studies that study the effect of policy measures and country characteristics on the incorporation decision and on the characteristics of entrants (see Ciccone and Papaioannou (2007), Demirgüç-Kunt, Love, and Maksimovic (2006), Desai, Gompers, and Lerner (2006), Djankov et al. (2002), Klapper, Laeven, and Rajan (2006), and Perotti and Volpin (2007)). In particular, a concurrent study by Djankov et al. (2008) analyzes a cross-section of 85 countries. They use survey-based information to build the tax burden of a 'standard' company with similar characteristics across all countries (the company produces and sells flower pots). This approach allows a direct comparison of the tax burden across countries using the 'effective' tax rate which applies to the chosen 'standard' company. However, it also limits the generality of the results, since the behavior of the 'standard' company may not be representative of a country's businesses. They find that the average entry rate over the years 2000 to 2005 is negatively affected by an increase in the 2004 corporate tax rate. Measured at the mean, a 10 percentage point decrease in the effective corporate tax rate is associated with an increase in the entry rate of 1.4 percentage points, compared to an average entry rate of 8 percent.

We develop our analysis assembling a novel firm-level panel dataset which covers 17 West European countries in the period between 1997 and 2004. The dataset is derived from the Amadeus database published by Bureau van Dijk, which contains data on over 9 million European companies and has already been studied by Klapper, Laeven, and Rajan (2006) in the context of entry regulation. These data allow us to measure in a precise, consistent way, the entry of incorporated firms in 17 European countries for each of the 8 sample years. In particular, the data allow us to build measures at the country-industry-year level, thus bringing the analysis to a more disaggregate level than most previous studies.

Europe offers a particularly interesting testing ground, both for the quality of these data and for the fact that relatively similar economies have experienced a diversity of tax and other economic policies over the last decade. Several European countries reduced statutory tax rates during the last decade, while at the same time also changing the

effective tax base, creating a variety of situations which we exploit econometrically.

We measure the effective average corporate tax rate using detailed yearly information for each country from Ernst&Young, a major multinational tax consultancy. Building on Devereux and Griffith (1998a), we account for the effects of corporate taxation at the local level, for alternative capital structures of entering firms, for personal taxation, and also for alternative measures of the tax burden, thus measuring taxation in a more precise way than previous studies.

What do the data tell about the effect of corporate taxation on entry? There is strong evidence that corporate taxation has indeed an effect on entry rates that is statistically significant and economically relevant. This evidence is consistently robust across a variety of specifications. Two results stand out. One is the evidence supporting a non-linear relation. This suggests that the effect of a tax reduction is at work only below a given initial threshold tax level. The effect is economically non-negligible. In our preferred specification, a reduction of the corporate tax rate from the median (30.08%) to the first quartile (27.57%) implies a 0.880 percentage point increase in the entry rate. We interpret this result on the basis of Cullen and Gordon (2007). They identify two distinct channels through which lower corporate taxation should increase entry by incorporation (through "income shifting" from personal to corporate taxation, and through "risk subsidy" to entrepreneurial activity), and one channel that has the opposite effect (through "risk-sharing" with the government). As we explain in Section 2, there are good reasons why the first two channels should have a stronger effect at lower levels of taxation, while the "risk-sharing" should have more effect (of opposite sign) at higher levels. A second intriguing result is that a reduction of the effective corporate tax rate is more effective in countries with a good institutional infrastructure, which we measure with the quality of accounting standards since these determine the extent to which profits can be hidden from taxation. On the whole, these findings point to the importance of corporate taxation for the creation of new successful businesses, and the need for including tax policy measures in future research.

The rest of the paper is organized as follows. Section 2 provides a conceptual framework. Section 3 describes the data. Section 4 computes the entry rates. Section 5 computes effective tax rates. Section 6 presents our results and is followed by a brief conclusion.

2 Theoretical Framework

This Section provides a simple theoretical framework to motivate our analysis and help interpret our results. The framework is based on some well known contributions to the literature that fit well our empirical framework. We focus on two issues. First, we want to

identify the channels through which the taxation of corporate income is likely to affect the entry decision, so as to guide our empirical modelling. Second, we want to put our results in context and consider how entry might affect industry structure; while these general equilibrium effects are not part of our empirical analysis, their consideration helps put the implications of our results for public policy in context.

The recent model by Cullen and Gordon (2007) motivates and guides our analysis by providing a unified framework for studying how taxation affects the incorporation decision, based on previous seminal contributions. In particular, their model identifies three channels through which corporate income taxation affects the entry (by incorporation) decision, on the basis that entrepreneurs can choose whether to incorporate or not their new business. While one might expect a higher corporate income tax to discourage incorporation across the board, the model shows that the effects of these three channels are potentially countervailing, so that their net outcome is not obvious.[2]

First, corporate income taxation often entails a lower tax rate than personal income taxation. This creates an "income shifting" effect that may encourage entry by incorporation when expected income from a new business is sufficiently high. We also notice that entrepreneurial risk-taking is likely to result in losses in the short-term; therefore—though Gordon and Cullen do not include this aspect in their article—"income shifting" is particularly beneficial when loss carry-forward provisions allow incorporated businesses to offset future profits with current losses.

Second, the progressivity of personal income tax rates creates a "risk subsidy" to entry by incorporation. Such subsidy depends on how exactly personal and corporate taxation are structured.

Third, when financial market imperfections prevent risk-sharing with investors, corporate income taxation allows sharing entrepreneurial risk with the government. Higher corporate income taxes create a "risk-sharing" effect through random payments to the government. This lowers the entrepreneur's risk-premium and encourages entry. While through the two previous channels lower taxation encourages entry, here taxation discourages entry.

Two implications of these countervailing incentives underpin our empirical analysis. First, the sign (and size) of the outcome of a change in corporate taxation is not *a priori* clear. Second, the effect is unlikely to be constant across different values of the effective tax rate, and one could expect non-linear effects.

One reason why the net outcome of reduced taxation is unclear is that through the "income shifting" and "risk subsidy" channels it leads to more entry, while through the

[2] We refer the reader to the article for the derivation of the model, in particular equation (1a) on page 1484.

"risk-sharing" channels it leads to less entry. Since all these effects entail a discrete choice—whether or not to incorporate a new business—, the distribution of expected profits, its profile over time, and the exact shape of the effective corporate income tax, all contribute to determining the net outcome in terms of entry. *A priori*, therefore, it is not possible to sign the outcome of a change in the effective corporate tax rate. Indeed, Cullen and Gordon's estimates for the US suggest that the (negative) "risk-sharing" effect is potentially as large as the other two (positive) effects. It is therefore important to bring the issue to the data.

Cullen and Gordon's model also suggests that changing corporate income taxation may affect entry rates in a non-linear fashion. All the three effects are likely to be non-linear, due to the discrete choice of the decision to incorporate. For this reason, any reasonable distribution of expected profits (i.e., any distribution that is not uniform) will result in a non-linear effect of taxation on entry.

Since entrepreneurial risk-taking often results in short-term losses the presence of carry-forward provisions will further enhance such non-linear effects for the "income shifting" and "risk subsidy" channels: even a small tax saving may ensure the long-term viability of businesses that expect low (or negative) profits. On the other hand the "risk-sharing" effect is likely to be more pronounced at high tax rates, since it is at high(er) rates that risk-sharing affects incorporation. These non-linear effects can potentially be very strong due to the highly skewed distribution of potential entrants' expected income.

Cullen and Gordon's model clearly identifies the channels through which corporate income taxation can affect the incorporation decision in a partial equilibrium setting with uncertainty. The effects of taxation on entry, however, could also spring from the interaction between entrants and incumbents that needs to be analyzed in a general equilibrium setting. To take this into account we look at a strand of theoretical literature that addresses the role of taxation on entry in the context of imperfectly competitive markets.

A seminal paper in this area is Besley (1989), who looks at the effect of the introduction of a per unit tax on the number of firms in equilibrium in a simple oligopoly model with quantity competition. He shows that whereas taxation affects negatively total industry output, both the output per firm (the 'intensive' effect) and the number of firms (the 'extensive' effect) may rise or fall when such a tax is imposed. The latter effect depends on the functional form assumptions for the inverse demand and the cost functions, and points to the need of empirical analysis.

Closer to the spirit of our paper, Romer (1994) and Appelbaum and Katz (1996) directly address the impact of corporate taxation on entry. Both models predict a negative effect. In the case of Romer's paper the gist of the argument is that taxes on ex post profits may severely restrict the provision of new goods in isolated monopolistic markets due to the presence of a fixed cost of entry. Appelbaum and Katz develop a model

that explicitly looks into the effects of corporate income taxation on incumbents' and entrants' behavior in an oligopolistic setting. They show that corporate taxation may affect industrial structure since it tends to favor incumbents over entrants through a "first-mover" advantage associated with the accumulation of profits by incumbents. Since profits provide incumbents with a "safety cushion," they may be willing to increase output strategically in order to deter entry. Taxation of profits naturally increases this effect, making entry less appealing.[3]

3 Data Sources and Definitions

3.1 Entry data

Our first data source is the Amadeus database published by Bureau van Dijk Electronic Publishing. The database is updated monthly and our analysis is based on each year's December issue, from 2000 to 2007. Amadeus collects company accounts from 38 European countries, covering financial information, industry activity codes, legal form, legal status, ownership, and date of incorporation. In principle, all non-financial companies required to file accounts should enter the database. The coverage has increased over time, and in 2007 it reached nearly 9 million companies. Data are collected from a variety of sources, including chambers of commerce and company registries, and are checked by Bureau van Dijk for consistency. A detailed description of the Amadeus database can be found in Klapper, Laeven, and Rajan (2006). Table 1 provides the definitions of all our variables.

We use information from Amadeus to construct our dependent variable: the entry rate at country–industry level. Section 4 details the steps involved in constructing this variable. While Bureau van Dijk made available an enlarged version of Amadeus since 1999, we cautiously build our dataset starting with the 2000 edition because only in that year we observe the coverage of European companies to increase substantially.[4]

3.2 Taxation data

Our main independent variable is a set of effective average corporate tax rates for each country, industry, and year. We build these variables from information we collect from the *Worldwide Corporate Tax Guide* and *The Global Executive* publications by Ernst&Young, a leading multinational tax consulting firm. These publications are compiled yearly by

[3] See also Pfann and Kranenburg (2003) for a structural model of entry and fiscal policy which looks at the effect of an input tax on the availability of new products in small markets.

[4] Before 1999 Bureau van Dijk published what is now the "Top 250,000" version, which includes only large companies.

Ernst&Young's local offices in over 140 countries following common criteria, ensuring high professional standards and consistency both over time and across countries.

From the *Worldwide Corporate Tax Guide*, we gather information on statutory corporate tax rates and on statutory depreciation rates. These include tax rates at the local level. From *The Global Executive* tax guide we collect data on personal taxation. TAX–EATR is the resulting effective average tax rate.

In order to compute effective tax rates at the country-industry level we need information about each industry's profitability, that we gather from the OECD's STAN database. Section 5 details the steps involved in constructing effective average corporate tax rates.

3.3 Economic policy data

Our second main independent variable, PRO-BUSINESS–POLICY, is the Index of Economic Freedom, published yearly by the Heritage Foundation (www.heritage.org) and the Wall Street Journal. We use this measure to account for a country's overall policy towards business creation. For each country and year, the Index spans nine specific policy factors (and the resulting economic 'freedom'): regulation of business activity (business freedom), regulation of international trade flows (trade freedom), extent of tax burden (fiscal freedom), extent of public ownership (freedom from the government), price stability (monetary freedom), regulation of banks and financial institutions (financial freedom), regulation of foreign investments (investment freedom), quality of property rights (property rights), and the enforcement of anti-corruption laws (freedom from corruption). Each factor is evaluated using national and international sources (e.g. World Bank publications, World Trade Organization data, OECD databases, national official publications, etc.) augmented with other synthetic indicators (e.g. Transparency International's corruption index, the Economist Intelligence Unit reports, etc.), and with qualitative opinions of an academic advisory board (see Beach and Kane (2007)).

A second set of policy variables comes from the *World Competitiveness Yearbook* (WCY), a yearly publication of the Institute of Management Development (IMD), a Swiss business school. Data from the WCY have been used in previous studies to measure economic policies and the quality of institutional infrastructure (e.g., Djankov et al. (2002)).

The WCY contains a set of indicators that are meant to capture the degree of business-friendliness of specific dimensions of the regulatory framework and vary across countries and time. A higher score denotes a more favorable policy from businesses' point of view. These measures cover the following areas: anti-trust regulations (ANTITRUST–REGULATION), the quality of the country's bureaucracy (BUREAUCRACY), the extent of corruption in the public administration (CORRUPTION), the strictness of hiring and firing regulations (LABOR–REGULATION), and the ease of access to (domestic or

foreign) capital by companies (ACCESS–CAPITAL). From the WCY we also employ an alternative measure of fiscal burden (PERCEPTION–TAX), that measures the extent to which corporate taxes are perceived by business leaders to discourage entrepreneurial activity.

3.4 Instrumental variables

In our analysis we take into account the likely endogeneity of tax policy. For this, we use five variables that come from three different sources. From the World Bank's Database of Political Institutions, which has been extensively used in the political economy literature, we take the ideological orientation of the chief executive's party (GOV–CENTER–LEFT), the number of players with veto power in the political system (VETO–POWER), and the degree of government fragmentation (GOV–FRAGMENTATION). From the International Country Risk Guide published by the PRS Group Inc. (www.prs.com) we take a measure of government stability (GOV–STABILITY), and from Wolfram Nordsieck's online database of parliamentary elections (www.parties-and-elections.de) we obtain the dates of legislative election in each country (ELECTION–DATE).

4 Computing Entry Rates

We build our sample of companies with the goal of obtaining a homogeneous, comparable set of firms across countries, across industries, and over time. Table A1 in the Appendix describes the steps we follow in selecting the firms that we include in the dataset. Our approach closely follows the strategy of Klapper, Laeven, and Rajan (2006).

First, we include all the 15 Western European countries which are members of the European Union: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. We also include Norway and Switzerland, two European countries that are not members of the EU.[5]

Second, we include all incorporated and limited liability companies, but exclude partnerships, sole proprietorships, cooperatives and other legal forms. One reason for this is that we want to focus on the creation of successful companies, rather than on firm creation *per se*. According to Eurostat, average employment in 2004 was 1.9 at un-incorporated companies and 38.5 at incorporated companies.[6] Incorporation provides entrepreneurs

[5] We do not consider Malta and Cyprus, which recently accessed the EU, because of their small size. We do not include also Baltic and Central European accession countries because of the different coverage in the years we consider.

[6] Several studies show that larger companies are more likely to incorporate See, for instance, Cullen and Gordon (2007), Gentry and Hubbard (2004), Mackie-Mason and Gordon (1997), and Georgellis and Wall

with protection from creditors, allowing them to take riskier, but potentially more rewarding, strategies. Incorporation also imposes on companies more transparency, which in turn allows better access to external finance (see Egger, Keuschnigg, and Winner (2009)). Both features should result in more growth. A second reason for excluding unincorporated firms is coverage. Amadeus coverage of incorporated companies is substantial and regular, largely because these companies typically have to file their accounts. Coverage is instead sparse and erratic for the other legal forms.

Third, we include firms active in manufacturing and in business-related services, and we exclude companies in the primary sector and in regulated services.[7] This yields 39 industries, measured at 2-digit NACE Revision 1 classification code level, the standard classification system used in Europe. There are 5,304 industry-country-year potential observations; from these we drop 421 observations for which we have less than five companies, and 78 observations relative to UK and Irish industries in 1997, for which data are missing. We obtain 4,805 usable observations.

Fourth, when a company reports both consolidated and unconsolidated statements, we only include the unconsolidated statements in order to avoid double-counting firms with subsidiaries (see Klapper, Laeven, and Rajan (2006) for a discussion).

Finally, we need to make some assumptions on the timing of our data. Amadeus includes all companies which are required to file their accounts; it keeps a company for four years after its last filing, and deletes the company (with its historical data) from the database afterwards. Amadeus also deletes companies which stop filing because they go bankrupt or are acquired.[8] We therefore expect that a company entering Amadeus in 2000 will remain in the database at least until 2004, and it will be deleted since 2005 if it stops filing accounts after 2000. The fact that firms are continuously included into and deleted from Amadeus justifies our choice of gathering data from consecutive Amadeus issues. While it requires substantially more work than downloading the historical data from one single issue, this strategy provides a more careful computation of entry rates.

We also need to choose how far back in time we gather information from. Because of delays in filing of accounting reports, and because of the time it takes to enter them in the database, we expect that a new company should appear in the database only two to three years after its incorporation.[9] Computing entry rates from 'too recent' Amadeus

(2006).

[7] We exclude these industries because their coverage is likely to be uneven across countries, as some industries are highly country-specific (such as mining or fishing) or differently regulated (such as public administration, health and social work).

[8] A company may stop filing for several reasons, including the fact that it does not meet any more the filing requirements of its country.

[9] Countries differ in the period a company can take to file its accounts. There can also be delays between the filing of the accounts and their recording in the database because BvD assembles data from local information providers and checks their consistency. This data gathering process increases data quality

issues brings the risk of over-estimating entry rates when many incumbents have been dropped because they stopped filing. At the same time, computing entry rates from 'too old' Amadeus issues brings the risk of under-estimating entry rates by losing entrants whose records are entered with a delay. We strike a balance by choosing to compute entry rates with respect to year $t-3$, where t is the issue year of the database for our base case analysis. We then use the data from year $t-2$ to check the robustness of our results to this choice.

For each of the eight available Amadeus December issues (from 2000 to 2007), we then compute two numbers. The first is the number of companies, in each country and industry, whose date of incorporation is $t-3$ (the 'entrants'). The second is the number of companies,whose date of incorporation precedes year $t-3$ that are still active in year $t-3$ (the 'incumbents').[10] The entry rate (ENTRY–COUNTRY–INDUSTRY) is given by the ratio of these two numbers:

$$ENTRY-COUNTRY-INDUSTRY_{ict} = \frac{(Number\ of\ entrants)_{ict}}{(Number\ of\ active\ incumbents)_{ict}}$$

where i indexes industries, c indexes countries and t indexes time. Entry rates for t=1997 are computed from the December 2000 Amadeus issue, entry rates for 1998 from the December 2001 issue, and so on. Country-industry entry rates (ENTRY–COUNTRY–INDUSTRY) constitute our dependent variable. For comparison with previous studies, we also report descriptive statistics for entry rates at the country level (ENTRY–COUNTRY).

5 Computing Effective Marginal Tax Rates

Obtaining a meaningful measure of actual corporate income taxation is not a trivial task. The statutory tax rate is not a satisfactory measure because taxation depends also on the tax base, i.e. taxable corporate income. A high corporate income tax rate applied to a thin tax base may in fact be more attractive than a lower tax rate applied to a larger tax base.

An alternative measure is given by the average tax rate, computed as the ratio of tax payments to taxable income. However, such 'implicit' tax rates are backward-looking as they reflect the effect of taxation on the past corporate history of profits and investment decisions.

A third approach is the so-called 'tax analyzer model' (see European Commission (2001)), where the computation of the tax burden is based on a 'standard' firm character-

but may also cause delays in the appearance of information in the database.

[10] A company is considered to be active in a given year if it reports at least some key accounting data for that year (total assets, sales, profits, number of employees).

ized by a set of features with respect to its industry, its balance sheet structure and size, its revenues, and its expected development over a given number of years. This methodology has the advantage of making comparisons across countries easier, even if one includes a large set of taxes and contributions, e.g. taxes on labor, property, energy, etc. The main drawback is that these measures lack generality, because they heavily rely on the specific characteristics of the 'standard' firm—that may not be equally representative across countries and across time. This is the approach used by Djankov et al. (2008).

A more satisfactory approach consists of using 'effective' tax measures. King and Fullerton (1984) were the first to propose an effective marginal tax rate measure, and Devereux and Griffith (1998b) propose the effective average tax rate (EATR). These measures have the advantage of being both theoretically grounded—they are based on a neoclassical theoretical model with forward-looking agents—and relevant for corporate decisions. Moreover, the EATR has been developed to study discrete investment choices like the decision to incorporate in a given country, which suits well our analysis. This is the approach we follow.

The computation of the EATR is based on the definition of a hypothetical investment project characterized by a set of assumptions about the type of assets purchased, the way it is financed, and the type of their investors. Taxes affect the rate of return of the investment, and the EATR is defined as the proportional reduction in the profitability rate that follows the taxation of the income stream generated by the investment:

$$TAX - EATR \equiv \frac{R^* - R}{R^*}$$

where R^* is the pre-tax net present value of the project, and R is the corresponding after-tax value. Like the 'tax analyzer model,' also the size and distribution of the EATR depend on some assumptions, but with the advantage of capturing the main features of national tax systems while allowing more generality in the evaluation of the corporate tax burden and requiring less stringent assumptions.[11] Notice, as we show in the Appendix, that the effective average corporate income tax rate, which is relevant for the incorporation decision, is not a linear function of the statutory tax rate, which is the concept one intuitively thinks of as policy instrument.

Several authors have adopted the EATR as the relevant measure of corporate tax burden for companies' decision among mutually exclusive discrete investment projects. For instance, Devereux and Griffith (1998a) study the effect of taxes on the location decisions of US multinational companies, while Bénassy-Quéré, Fontagné and Lahrèche-Révil

[11] In principle, one should also account for the fact that some entrants are subsidiaries of multinational companies, and include the effective tax rate relevant in their home country. However, it turns out that foreign entrants are only a tiny fraction (about 2%) of the total, so that we do not analyze this interdependency.

(2005) and Buettner and Ruf (2007) analyze the link between corporate income tax rates and foreign direct investments in European countries. We now describe the assumptions underlying the computation of the EATR, following the methodology of Devereux and Griffith (1998b).

5.1 Assumptions on the investment project

We consider a domestic investment in plant and machinery by a resident company. As we discuss in Section 5.5, our empirical results are unchanged when the investment also includes industrial buildings, office equipment or intangible assets. The project is characterized by a rate of return and a cost of capital. The (forward-looking) rate of return of the investment is industry-specific. Our baseline hypothesis is that the rate of return associated with the project is equal to the rate of return in the corresponding US industry, irrespective of the particular European country where it is undertaken. In other words, we conjecture that an industry's profitability is closer to its 'natural' rate in the US, because of fewer regulations and restrictions to competition and entry, and therefore a more competitive environment. Moreover, the period under study has seen profound structural changes in European economies, so that past EU profitability may have been a poor gauge of future profitability.

We approximate the profitability rate by the difference between an industry's total value added and total cost of labour as a percentage of total value added: (Total Value Added – Total Labor Cost)/Total Value Added. We obtain data to compute yearly profit rates for US industries from the OECD STAN database.[12]

Modelling the project's cost of capital requires some assumptions on the sources of finance. In our base case we assume that the investment is fully financed by new share issues. Notice that in the absence of personal taxation, there is no difference for the effective marginal tax rate whether the project is financed by retained earnings or the issue of new shares. We also consider debt financing. The main effect of allowing debt is the possibility to deduct interest payments, creating a 'debt tax shield' that reduces the amount of taxable income. Therefore, the inclusion of debt leads to lower effective average tax rates, all else equal. To account for this effect we introduce an effective average tax rate that incorporate the effect of the tax shield (TAX–EATR–DEBT).

[12] Devereux and Griffith (2003) show that the EATR approaches the statutory tax rate as profitability increases, and the two coincide for profitability rates close to 100%. When the investment is very profitable, the stream of income of the project largely exceeds its costs, and tax allowances become less important. In our data, in the absence of personal taxes, industries with very high profitability rates in the US experience an EATR that is larger than in industries with low profitability. Examples of industries with high profitability rates are public utilities (76% on average), real estate (90%) and renting of machinery and equipment (77%). Industries with low profitability include textiles (26%), and medical, precision and optical instruments (13%).

Inflation rates and interest rates also affect the cost of the investment through their effect on the discount rate and on tax allowances on assets. Tax allowances depend on the fiscal depreciation rates that are applied to the historical cost of the asset, without adjusting for inflation. As inflation increases, nominal interest rates increase and the net present value of tax allowances decreases, all else equal. Lower tax allowances, in turn, mean higher after-tax investment cost and a higher effective average tax rate, all else equal.

We obtain inflation rates from Eurostat. Inflation rates vary over time and across countries, but not across industries. Following the literature, we assume a common inflation rate for output and capital. The real interest rate is then obtained as $(1 + r) = (1 + i)/(1 + \pi)$, where r is the real interest rate, π is the inflation rate and i the nominal interest rate. Nominal interest rates also vary over time and across countries; they are given by interest rates on one-year public bonds, and are obtained from the Bulletin of the European Central Bank.

5.2 Assumptions on the tax system

The assumptions about the investment project allows us to obtain an estimate for the pre-tax value of the project (R*). To compute the after-tax value of the investment (R) we need to introduce a set of assumptions on corporate and personal tax rates. In Tables 2 and 3 of the Appendix we provide formal definitions and further details, which largely follow Devereux and Griffith (1998a).

TAX–EATR depends on statutory tax rates, depreciation rates, and tax allowances on assets. An increase in the corporate tax rate, lowering the after tax rate of return to the investment, raises TAX–EATR (all else equal). However the change in TAX–EATR is less than proportional, because of the presence of tax allowances on capital assets. Higher capital allowances lower TAX–EATR. In our baseline specification we present results based on the maximum fiscal depreciation rate for plant and machinery, and on current capital allowances for each country. These results are robust to using a large variety of weighted averages of depreciation rates for plant and machinery, industrial buildings, office equipment and intangible assets.

As a robustness check, we also consider a specification that includes local taxes (TAX–EATR–LOCAL), and a specification that includes personal taxation (TAX–EATR–PERSONAL).[13]

[13] The exclusion of personal taxation can be justified on a number of grounds. First, in the absence of personal taxation, we are able to concentrate on the effect of the corporate tax rate, through the effective tax rate, on our measure of entry. Second, introducing personal taxation requires making assumptions about shareholders' attributes like nationality or income, so that the choice of the 'correct' shareholder is to some extent arbitrary. Finally, from a theoretical point of view, the assumption of international perfect capital mobility should make the investment behaviour of firms independent of personal taxes.

The relevant personal income includes interest income, dividend income, and capital gains.[14] We collect data on the three corresponding final (i.e., after witholdings) tax rates for a resident taxpayer. The personal tax rate on interest income is the tax rate on income from interest-bearing investments (e.g., deposit accounts, bonds, and other securities). The personal tax rate on dividends (and the corresponding tax credit) is the maximum tax rate on dividend distributions, and the personal capital gains tax rate is the tax rate on capital gains from the disposal of shares. The personal tax rate on interest income negatively affects shareholders' discount rate. Higher taxation of dividends increases the effective average tax rate associated to the investment. Finally, the taxation of capital gains has an ambiguous effect since it influences both the shareholders' discount rate and the return on the investment.

6 Empirical Analysis

6.1 Descriptive evidence

We start our analysis by describing our data. Table 1 provides the definitions and sources of all variables. Table 2 reports descriptive statistics for the whole sample. Table 3 reports descriptive statistics by country for entry rates and for our two main independent variables. In addition, Figures 1, 2, and 3 describe the evolution over time of the main variables of interest.[15] Four characteristics of the data are worth mentioning at this stage.

First, the mean yearly entry rates at the aggregate level (8.27% for the ENTRY–COUNTRY variable, and 7.02% for the ENTRY–COUNTRY–INDUSTRY variable, see Table 2) hide a significant between-country variation (see Table 3). The UK, Denmark and Austria show consistently high entry rates, while Italy, Luxembourg, the Netherlands and Portugal show consistently low entry rates. Comfortingly, our ranking of countries is very similar to the one reported in Djankov et al. (2008) and in Klapper, Laeven, and Rajan (2006). It is important to acknowledge the possibility that these differences do not reflect underlying differences in industry dynamics but differences in data collection practices across countries.[16] For this reason it is crucial to be able to rely on panel data, which allow us to exploit the longitudinal dimension to control for any possible industry–

[14] From the point of view of a shareholder, the stream of taxable income that the investment generates is given by dividends and capital gains. The tax rate on interest income instead affects the shareholder's nominal discount rate.

[15] Our data constitute an unbalanced panel because of missing observations for some country-industry pairs and/or years, as we explain in Section 4. Notice that in Table 2 and Figure 1 Switzerland has a very high country-level entry; this is due to the high entry rate for 1997, probably because of a change in filing requirements in that year.

[16] For instance, the observed low entry rates for Italy and Ireland might, at least partly, depend on an incomplete coverage for the 'date of incorporation' or for the 'industry' variable, respectively.

country systematic differences in the data collection. This is an important improvement on the previous literature.

Second, as it is apparent from Table 3, there is a negative correlation at the country level between corporate taxation (TAX–EATR) and a country's policy attitude towards entrepreneurship as proxied by the PRO–BUSINESS–POLICY variable. For instance, Ireland has the lowest corporate tax rate and the highest score for the PRO–BUSINESS–POLICY index. At the opposite, most Southern European countries (France, Greece, Italy, Portugal, and Spain) have high corporate tax rates and at the same time denote a relatively unfriendly attitude towards entrepreneurship. This implies that the identification of the direct effect of corporate taxation on entry requires to control for other economic relevant factors which are likely to move together with taxation both cross-sectionally and longitudinally.

Third, since our identification strategy exploits only within-country variation, we provide some *prima facie* evidence on the evolution of the empirical distributions of our main variables of interest over time (see Figure 1). Overall, entry rates show a moderately pro-cyclical pattern not only at the mean but also at most quartiles. Effective average tax rates are characterized instead by a pronounced downward trend at the mean, which is only partially reproduced at the quartiles (see Figure 2), consistent with the results of Slemrod (2004). On the contrary, PRO–BUSINESS–POLICY shows a clear upward trend both at the mean and at the quartiles (see Figure 3). This points again to the potential identification problems associated to the omission of country-specific time-varying controls, and provides an additional motivation for the use of panel data.

Fourth, a simple comparison between the distribution of our main measures of effective marginal tax rates (TAX–EATR, TAX–EATR–LOCAL and TAX–EATR–DEBT) and the distribution of the effective marginal rates that includes personal taxation (TAX–EATR–PERSONAL) shows that the inclusion of personal taxation increases not only the mean—as obviously expected—but also the variance (Table 2). To what extent this is a genuine feature of taxation in European countries or instead an undesired effect of the difficulties in obtaining country-year consistent series on personal taxation is difficult to say. For this reason we cautiously avoid including personal taxation in our main analysis, and check the robustness of our findings to its inclusion in our robustness checks.

Finally, we notice that it is important for the interpretation of our results that changes in TAX–EATR come from genuine variation in statutory tax rates at the country-industry level, and not from variation in different components of the effective average tax rate. We verify that this is indeed the case. An increase in the statutory tax rate from 25th to the 75th percentile (i.e., from 28% to 35%) results in TAX–EATR rising from 25.1% to 31.4%; this corresponds to a shift from the 10th to the 55th percentile in the distribution

of TAX–EATR. By contrast, an increase of the profitability rate from the 25th to the 75th percentile brings an increase of EATR of only 1.7 percentage points (from 27.4% to 29.1%).

6.2 Estimation Strategy

We now discuss the empirical strategy that we follow to estimate the relationship between entry rates, on the one hand, and corporate taxation and other potentially relevant country characteristics, on the other hand. Let y_{ict} be the entry rate at time t referred to industry i located in country c. We estimate the following equation:

$$y_{ict} = \alpha_t + \mathbf{g}(Tax_{ict-1})'\boldsymbol{\gamma} + \mathbf{x}_{ct-1}^{'}\boldsymbol{\beta} + \eta_{ic} + \varepsilon_{ict} \tag{1}$$

The main variable of interest is Tax_{ict-1}, which represents the (lagged) effective tax rate (TAX–EATR) and varies across time, industries, and countries. TAX–EATR is the relevant tax rate to be applied to discrete investment projects. In equation (1) we allow the effective tax measure to enter non-linearly with alternative polynomial specifications, which we discuss in the next Section. The variable α_t is a time effect that we model by introducing year dummies. The vector $\mathbf{x}_{ct-1}$ includes a set of (lagged) observable regressors which vary across countries and over time, but not across industries. These variables represent additional country-specific time-varying factors potentially affecting entry rates.

The two remaining variables in equation (1) are unobservable error components. In particular, the term η_{ic} represents a country-industry specific effect capturing the set of characteristics which are relevant to the entry decision but cannot be included among the regressors because they are not observed. These include country-specific characteristics (e.g. cultural attitudes towards entrepreneurship) and industry-specific characteristics (e.g. structural entry barriers), as well as unobservable factors which vary across both industries and countries but that can be reasonably thought to be constant over time, at least during our sample period (e.g. industry specialization).

The main econometric challenge is to consistently estimate $\boldsymbol{\gamma}$ and $\boldsymbol{\beta}$ under reasonable identification assumptions. Problems here can arise for two different reasons. First, some of our explanatory variables are potentially correlated with unobservable (or unobserved) time-invariant, country-industry level omitted variables. To overcome this first source of endogeneity it is standard practice to use appropriate transformations (e.g. 'within group' or 'first differences') which remove unobserved heterogeneity, η_{ic}, from the original model. Notice that in our set-up standard errors are robust to within-unit (ic) heteroskedasticity and autocorrelation of unknown forms. Given our within-group transformation we also

allow for any arbitrary form of spatial correlation in both dimensions (industry and country) to the extent that spatial clustering is captured through the unobserved effect, η_{ic} (see Wooldridge (2006), p.12).

The second problem is that the identification of structural effects through regression coefficients in deviations from country-industry specific means (i.e. the within-group transformation) requires lack of correlation between the regressors and the idiosyncratic error term at all leads and lags. This strict exogeneity assumption rules out the possibility that current values of some of the explanatory variables are correlated with present and past idiosyncratic errors. This is unlikely to be the case here since policy-makers might well respond to shocks which are negatively correlated to entry rates by lowering corporate taxation.

The standard solution to this second source of endogeneity is to find convincing external instruments. In this paper, we borrow from the recent political economy literature and explore the possibility of using several complementary measures of the political process (see, e.g., Pagano and Volpin (2005)). These include the date of election (ELECTION–DATE), the ideological orientation of the elected government (GOV–CENTER–LEFT) as well as its perceived stability (GOV–STABILITY). Furthermore, we also take into account two proxies for the fragmentation of the political system: VETO–POWER, a measure of ideological heterogeneity in the cabinet, and GOV–FRAGMENTATION, a measure of fragmentation of the opposition. As it is well known, good instruments have to be both valid—that is orthogonal to the transformed error term ε_{ict}—and relevant (or non–weak)—that is 'significantly' correlated with the endogenous variables. Accordingly, the set of instruments to be included in the relevant first stages has been selected from the available list on the basis of appropriate specification tests for instrument validity (Hansen J and C tests)[17] and relevancy (Cragg-Donald and Kleibergen-Paap tests).[18]

Notice that the nature of our analysis prevents us from using several (largely) time-invariant instruments that are widely employed in cross-country studies, and which relate to the nature of the electoral system, such as the use of majoritarian or proportional electoral rules, the tenure of democracy, or the minimum share of votes necessary to

[17] Hansen's J Statistics is the well-known Sargan-Hansen test of overidentifying restrictions, and it is distributed as chi-squared under the null hypothesis that the instruments are valid.

[18] Note that weak-identification tests are not fully developed for the case of non-i.i.d. errors. In particular the weak identification test that uses the Cragg-Donald statistic (Cragg and Donald (1993)) requires an assumption of i.i.d errors (Stock and Yogo (2005)). This is potentially a serious problem in our context (and indeed in most applications), where heteroskedastcity, autocorrelation, and possibly also clustering are likely to be present. Under these circumstances a large test statistic might not be a signal of model adequacy but simply reflects the fact that the disturbances are not i.i.d.. Baum et al. (2007) suggest reporting the Kleibergen-Paap statistic (Kleibergen and Paap (2006)) as the robust analog of the Cragg-Donald statistic, and to use with caution the critical values computed by Stock and Yogo, since critical values for this statistic are not available.

obtain parliamentary representation etc. (see, e.g., Milesi-Ferretti, Perotti, and Rostagno (2002) and Persson and Tabellini (2004)).

6.3 Econometric results

We address the effect of corporate income taxation on entry rates by estimating several versions of equation (1). Our baseline specification includes as explanatory variables (a quadratic expression in) TAX–EATR and PRO-BUSINESS–POLICY. The quadratic term in TAX–EATR allows us to test the existence of non-linearities of the form described in Section 2. We also experimented with higher order terms in TAX–EATR, but these are not significant at conventional statistical levels in all reported equations. Also, the null hypothesis that the parameter on the second order term is equal to zero is strongly rejected. PRO-BUSINESS–POLICY, the economic freedom score, proxies for time-varying country-specific policies towards firm creation. This variable is expected to enter our equations with a positive sign. Within-group estimation results are reported in column 1 of Table 4.

Our findings can be summarized as follows. Firstly, the coefficients on corporate taxation (TAX–EATR and TAX–EATR–SQ) are found to be respectively negatively and positively signed. They are also both significant at conventional statistical levels. Secondly, as expected, PRO-BUSINESS–POLICY is found to be positive and significant.

We find that a reduction of the tax rate from the median (30.04%) to the first quartile (27.57%) implies a 0.107 percentage point increase in the entry rate. On the other hand, a reduction from the third quartile (33.44%) to the median is found to have the opposite sign (–0.145). Furthermore, both effects are significant at conventional statistical levels. Taken at its face value, this implies that the marginal effect on entry rates is a negative function of the initial tax rate.[19]

Before drawing strong conclusions, however, we need to address the main limitation of our estimation approach, namely the strong exogeneity assumption for TAX–EATR, and TAX–EATR–SQ. For this reason we report in column 2 of Table 4 additional estimates based on alternative—and more plausible—orthogonality assumptions. Building on the recent political economy literature, we use as instruments four variables: GOV–CENTER–LEFT, VETO–POWER, GOV–STABILITY, and ELECTION–DATE. These variables are defined in Table 1. The crucial identification assumption is that these variables do not affect entry rates directly, but only indirectly, that is through their effect on corporate tax decisions at the political level. In the first stage regressions (reported in column 3) more stable governments (GOV–STABILITY) at the beginning of their term (ELECTION–

[19] Imposing linearity would be incorrect, since this is rejected by the data. Still, if we did this, we would find a negative and significant coefficient equal to –0.028. This effect is smaller than that found by Djankov et al. (2008), who find that a decrease of ten percentage points in taxation brings to a 1.4 percentage point increase in the entry rate.

DATE) and operating in less fragmented political systems (VETO–POWER) turn out to be associated with lower levels of corporate taxation.[20] Comfortingly, both the validity of this set of instruments and the exogeneity assumption for the PRO-BUSINESS–POLICY variable are not rejected by the data according to Hansen's J and C statistics. This suggests that the data, in our context, support our choice to treat policy towards firm creation as exogenous. As we show in Section 6.5.3, our results however hold also in the case where we treat PRO-BUSINESS–POLICY as endogenous and instrument it along with taxation. Analogously, the null of weak identification is rejected at conventional statistical levels according to both the Cragg-Donald and the Kleibergen-Paap statistics.

Once we instrument TAX–EATR, the effect we detect (see column 2 of Table 4) is statistically significant and economically non-negligible. A reduction of the corporate tax rate from the median (30.04%) to the first quartile (27.57%) implies a 0.880 percentage point increase in the entry rate. A reduction from the third quartile (33.44) to the median implies a 0.270 percentage point increase in the entry rate. This result is consistent with the "income shifting" and "risk subsidy" effects of a reduction of effective corporate taxation being stronger at lower levels of taxation, and the "risk-sharing" effect being stronger at higher levels. This is not surprising, given the well known-fact that the distribution of many firm level variables, including the size and the profitability of entrants, is highly skewed (Cabral and Mata (2003)). Notice also that the instrumented estimates are larger than those of the within-group regressions. Comfortingly, the Cragg-Donald and Kleinbergen-Paap statistics support the relevance of our instruments. Possible explanation for this difference in estimates are therefore the violation of the strict exogeneity assumption or a possible attenuation bias associated with error in the measurement of the tax variables.

6.4 Extensions

In this section we extend our results in three directions. First, we include into the analysis tax provisions for new businesses, in particular the possibility to carry forward losses. Second, we consider including alternative time-varying potential policy determinants of entry. Third, we put our results in context, and make a first step in asking when taxation policy is more effective.

[20] At first sight, the sign of the GOV–CENTER–LEFT might seem counterintuitive. Note, however, that identification here is achieved only through within-country variation, and therefore this result is likely to be sensitive to single specific episodes. Indeed, a closer inspection into the data reveals that the negative sign on GOV–CENTER–LEFT reflects almost exclusively the reduction in corporate taxation introduced by the left-wing German government of chancellor Schroeder after 1998.

6.4.1 Accounting for loss carry-forward provisions

New businesses often receive a more favorable tax treatment. A major advantage they enjoy is the possibility to carry losses forward to future fiscal years (see Da Rin, Nicodano, and Sembenelli (2006) for a discussion).[21] Table 5 reports results where we include loss carry-forward (CARRY–FWD) and loss carry-back (CARRY–BACK) provisions. Column 2, that reports the instrumented estimates, shows a positive effect of carry-forward provisions, that is statistically highly significant. As expected, CARRY–BACK turns out to be less important for newly incoporated companies, that are unlikely to have paid taxes in the past. We also notice that our estimates for TAX–EATR and TAX–EATR–SQ retain the sign, size, and statistical significance they had in Table 4, confirming that including or not tax provisions for new businesses does not materially affect our analysis.

6.4.2 Alternative economic policy measures

In Table 6 we replace the PRO-BUSINESS–POLICY variable with a set of alternative variables which are meant to capture separately specific country characteristics which reflect non-tax economic policies with a potential effect on entry rates. For example, Klapper, Laeven and Rajan (2006) show that regulation costs reduce entry rates. Ciccone and Papaioannou (2007) find evidence of a negative relationship between bureaucracy (measured by the number of procedures a start-up has to comply with) and entry, while Perotti and Volpin (2007) highlight the role of financial development and investor protection in incorporation decisions. We therefore consider policies aimed at increasing market competition (ANTITRUST–REGULATION), reducing bureaucratic red tape (BUREAUCRACY), avoiding corruption in the public sector (CORRUPTION), lifting hiring and firing constraints (LABOR–REGULATION), and fostering financial development (ACCESS–CAPITAL). Since these variables capture different aspects of a government's overall attitude towards the economy, it is not surprising that they are highly collinear. For this reason we introduce them one at a time.[22]

All of these variables have the expected sign, and three out of five are significant. The precision of the point estimates is indeed almost surprising since we already control for time-invariant country-industry components and therefore for these variables we exploit in estimation only the small, and often correlated, within-country variability component. More importantly from our perspective, the coefficients on TAX–EATR and TAX–EATR–

[21] In principle, one would like to include not only loss-carry forward provisions, but also all possible tax advantages bestowed on small businesses. We have tried hard to collect systematic longitudinal data of this kind. However, it turned out to be an impossible task due to the sheer number of national and local programmes, their complexity, and the difficulty of identifying them in a systematic way.

[22] We only report the GMM-IV regressions to fit the results in a single table; within-group and first stage regressions are similar to the results of Table 4 and are available upon request.

SQ, always statistically significant, are very close to our baseline estimates. This result is also interesting in its own right since it points to the importance of several different policy dimensions for the entry decision.

6.4.3 When is corporate tax policy most effective?

Now that we have established the importance of tax policy for entry rates, one interesting question is to further ask whether the relationship between corporate taxation and entry rates is constant, or whether it is a function of country-specific characteristics. To explore this issue we look at accounting standards. These are a relevant element of a country's institutional infrastructure in our context because the benefits of a corporate tax reduction are likely to be smaller in countries where it is easier to avoid the tax burden through the manipulation of accounting books. In such countries, it may be easier to hide profits from taxation, so that a lower corporate tax rate has less influence on the incentives to create (or incorporate) a new company. For this reason, we partition our set of countries according to whether their accounting standards are relatively 'bad' (Austria, Belgium, Denmark, Germany, Greece, Ireland, Italy, and Portugal) or 'good' (Finland, France, Luxembourg, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK). We take this partition from LaPorta et al. (1998), by dividing countries on the basis of the reported ranking and using the median as cutoff point.

Results are reported in Table 7. A quadratic specification is found to hold for both subsets of countries, especially for the GMM-IV estimates reported in column 2. Moreover, given the different shape of the two quadratic functions, the effect of a reduction in TAX–EATR has a larger effect in countries with 'good' accounting standards at the lower tail of the distribution of corporate taxation, that is when corporate taxation is found to have a larger and more significant effect. This result supports our conjecture that lax accounting standards allow more tax elusion (or evasion), and corporate taxation matters less for entry since firms can already shield from taxation part of their income. The normative implication of this finding is that policy-makers may increase the efficacy of a reduction of corporate taxation by first making accounting standards more rigorous.

6.5 Robustness checks

In this section we assess the robustness of our baseline results with respect to four issues: (i) alternative assumptions in the computation of the effective average tax rates (Table 8); (ii) alternative taxation measures (Table 9); (iii) the endogeity of PRO–BUSINESS–POLICY (Table 10); and (iv) robustness to several of the assumptions we make in our baseline model.

6.5.1 Alternative assumptions in the computation of TAX–EATR

As discussed in Section 5 (and in the Appendix), several assumptions have to be made in order to derive an appropriate measure of the effective average corporate income tax rate. A first issue is that our original measure TAX–EATR does not include local or municipal taxes, surtaxes and supplementary charges. From a theoretical perspective, there is no reason why these tax components should not be included. Still, there is a legitimate concern that their inclusion might create measurement error problems since building appropriate time-consistent series for these components of corporate taxation is a very difficult task. This derives from the need to compute the appropriate tax base for local taxes, which often differs for the tax base applicable to the national corporate income tax. Furthermore, the fact that firms are observed at the national level makes the choice of the 'appropriate' local taxation level rather arbitrary. Estimates presented in the first three columns of Table 8 address this issue by replacing TAX–EATR with an alternative tax measure (TAX–EATR–LOCAL) which includes these additional tax components. In spite of our concerns, reported results turn out to be very similar to those already discussed in the previous section.

Columns 4 to 6 of Table 8 address our assumptions on how the project is financed. Since TAX–EATR is computed under the assumption that the project if fully financed by issuing new shares, we have computed an additional measure (TAX–EATR–DEBT) where it is assumed that the project if fully financed by new debt.[23] The results show that punctual estimates tend to be lower than the baseline case when WG estimation is used. However, the GMM-IV coefficients reported in column 5 are very similar to the GMM-IV estimates reported in Table 4, although our diagnostics signal potential weak identification problems.

A third potential drawback of our original specification is that we overlook personal taxation in the computation of the effective tax rate. This is not uncommon in this literature, and can be justified by noticing that in many countries the system of personal taxation is so complex that one can well imagine a large variety of personal tax positions. This, in turn, makes the identification of the 'representative' investor quite arbitrary. With this caveat in mind, and following Devereux and Griffith (1998b), we have computed an additional tax measure, TAX–EATR–PERSONAL, which incorporates personal taxation in our benchmark case where the firm is fully financed by new share issues.[24] As it can be seen from column 7 of Table 8, within-group estimates of the coefficients on the tax

[23] Note that in the absence of personal taxes financing through retained earnings or through the issue of new share yields the same expression for the effective tax rate. Our results are robust to using any combination of financing sources.

[24] Similar results are found also with different combinations of financing sources, including the polar case of full reliance on debt.

variable turn out to be insignificant, both statistically and economically. The fact the within-group estimator provides an imprecise point estimate is not surprising, as it probably reflects measurement error problems associated to the introduction of the personal taxation elements in the formulas for corporate taxation. Finding an appropriate set of instruments for TAX–EATR–PERSONAL has also proved to be a very difficult task.[25] As an illustrative example, in columns 8 and 9 we present the results obtained when using as instruments GOV–CENTER–LEFT, GOV–STABILITY, and GOV–FRAGMENTATION. Comfortingly, estimated coefficients come closer to those reported in Table 4 even if they are not statistically significant at conventional levels. Note also that our specification tests signal some unsolved mis-specification issues.

6.5.2 An alternative corporate tax measure

It might also be argued that potential entrants do not take their entry decision on the basis of the effective tax rate but are driven by more qualitative factors which reflect entrepreneurs' perception of government behavior towards corporate income taxation. To address this issue we replace TAX–EATR with an alternative— more qualitative—survey-based variable obtained from the World Competitiveness Yearbook. PERCEPTION–TAX is an ordinal variable that tries to measure the perceived attitude of national fiscal policies toward entrepreneurship. Results are reported in Table 9 and conform to expectations. In fact, both in column 1 (within-group) and in column 2 (GMM–IV) the coefficient of PERCEPTION–TAX is negative and significant. Note, however, that the Hansen's J statistic is very high, casting some doubts on the validity of our instruments in this particular equation.

6.5.3 The endogeneity of economic policy

Even if our endogeneity tests do not reject the null of exogeneity for PRO–BUSINESS–POLICY, some legitimate concerns could still be raised on the basis of speculative economic reasoning.[26] In principle, entry rates and some of the variables which are part of PRO–BUSINESS–POLICY (e.g., regulation of foreign investment) could be simultaneously affected by transitory unobserved shocks. To address this potential criticism, Table 10 reports the results of additional GMM-IV estimates, where PRO–BUSINESS–POLICY is treated as endogenous and instrumented with the same set used for TAX–EATR and TAX–EATR–SQ. Two interesting findings are worth highlighting. First, not only our weak

[25] Note that TAX–EATR–PERSONAL is only weakly correlated with the other tax measures: TAX–EATR, TAX–EATR–LOCAL, and TAX–EATR–DEBT.

[26] The endogeneity test (Hansen's C statistic) is performed to verify the exogeneity of PRO-BUSINESS–POLICY. The statistics is distributed as chi-squared under the null hypothesis that the specified endogenous regressors are exogenous.

identification tests allow us to reject the null, but also our first stage results are consistent with reasonable priors about the effect of the political environment on business policy. Second, and more important for the purpose of the paper, all our previous results are confirmed. In fact, the coefficients on TAX–EATR and TAX–EATR–SQ retain their sign, magnitude, and statistical significance. Furthermore, PRO–BUSINESS–POLICY is found to have a positive coefficient, although this is not significant at conventional statistical levels.

We follow the same procedure also for the five individual policy measures obtained from the *World Competitiveness Report*. The results, which are available upon request, confirm those of Table 6, in that the effect of corporate taxation retains the same levels of statistical and economic significance. In this case we also find that all policy measures retain their statistical and economic significance. The only exception is in the case of labor regulations, where the effect of corporate taxation becomes insignificant at conventional levels.

6.5.4 Additional robustness checks

We have already reported our checks on the robustness of our results against the main assumptions underlying our analysis. We also want to mention, without reporting for space reasons, several additional checks, that are available upon request.

First, all our results are obtained with entry rates computed at $t-3$. We also compute entry rates with information at $t-2$. We find that our results do not depend on this choice, neither in terms of statistical significance, nor in terms of economic magnitude.

Second, we ran several additional robustness checks on the other assumptions underlying the computation of TAX–EATR. This include alternative composition of the asset base (i.e., a different mix of machinery and buildings, office equipment, and motor vehicles), and a wide range of alternative economic depreciation rates, from 5% to 20%. We also include intangible assets in the composition of the asset base. We find that these different assumptions do not affect any of our results.

Third, we introduce additional time-varying covariates which have been found in the literature to affect entry rates. Klapper, Laeven and Rajan (2006) include the ratio of industry sales to total sales in order to capture a potential 'convergence effect' that might operate at the industry level, whereby larger industries are expected to display lower entry rates. For this, we compute the INDUSTRY–SHARE variable and we include it in an augmented version of our baseline specification. We find that the coefficient for the industry share is negative, as expected, but not statistically significant. More importantly, the effect of taxation on entry rates retains its magnitude and remains significant.

Fourth, we consider the possibility that business cycles unfold differently across coun-

tries. For this, we obtain from Eurostat two measures of the economic cycle for each country and year: the level of GDP, and its percentage variation. We obtain results which are very similar, in both economic and statistical significance, to those of our baseline specification.[27]

Fifth, we consider that our choice of US profitability as the natural benchmark may be questionable, on the ground that European firms would base their choice on expected profitability in Europe, or even just in their own country. We therefore substitute US profitability at the industry level with either (i) a measure of Europe-wide average profitability, or (ii) a measure of country-industry profitability. In either case, none of our results is materially affected.

Finally, we consider that our main dependent measure is an entry ratio. The reason we look at a ratio is that we want to capture the importance of entry relative to the current size of an industry. However, we want to make sure that the effect we are capturing does not depend on the distribution of incumbents across industries. For this, we also estimate our equations by considering an absolute measure of the number of entrants. Since there is high variability in this measure we adopt two alternative approaches. First, we use the logarithm of the number of entrants. Second, we normalize the number of entrants by the country's population, which is arguably independent of the distribution of incumbents across industries. The results we obtain for these specifications are very close to those of our main specification of Table 4, confirming a concave effect of corporate income taxation.

Overall, therefore, our results appear to be consistently robust to a wide variety of modifications of our baseline specification.

7 Conclusion

In this paper we pose ourselves a research question which is also relevant from a policy perspective, that is whether, and to what extent, lowering corporate income taxation can foster entrepreurship by inducing the entry (by incorporation) of new companies. To answer this question, based on recent theoretical models of how taxation may affect entry, we have exploited a newly constructed dataset which allows us to improve significantly on the existing literature. In particular, the availability of disaggregate data with a longitudinal dimension allows us to control for unobserved heterogeneity at the country-industry level, therefore avoiding the endemic omitted variable problem which affects previous purely

[27] As a further check we also employ a set of country-year dummies. Naturally, these absorb most of the variation we are using to identify econometrically the parameters of interest. Therefore, it is not surprising that the significance of the taxation measures falls below conventional levels. However, the size of the estimated coefficients for TAX–EATR and TAX–EATR–SQ remain very close to those in the baseline specification.

cross-sectional studies. In addition, and equally important, we recognize in the paper that additional endogeneity problems are likely to arise in this context because of feedback effects. These might occur to the extent that policy-makers adjust corporate tax rates to industry-wide idiosyncratic negative entry shocks. To address this problem, we borrow from the recent political economy literature and introduce an innovative—and hopefully convincing—instrumenting strategy.

What is the final verdict on the effect of corporate taxation on entry? On the whole, there is strong evidence, which is robust across a variety of specifications, that corporate taxation has indeed a statistically significant effect. This effect is robust to alternative definitions of taxation and to the inclusion of a wide set of explanatory variables. Importantly, we also find evidence supporting a non-linear relation which suggests that the effect is at work only below a given initial threshold tax level. We also find that the effect is economically non-negligible. In our preferred specification, a reduction of the corporate tax rate from the median (30.04%) to the first quartile (27.57%) implies a 0.880 percentage point increase in the (country-industry) entry rate, or 12.5% of the 7.02% mean entry rate. Interestingly, we also find that a reduction in corporate tax rates is more effective in countries with better institutional infrastructure, as measured by the quality of accounting standards, suggesting that a reduction in corporate tax rate would generate the creation of more companies in countries where it is more difficult to hide income by manipulation of the profit and loss accounts. This suggests a policy trade-off: while lowering taxes may be easier to implement, countries with lower accounting standards may find that such policy is indeed ineffective. Therefore, our analysis points to the complementarity of taxation with more 'structural' policies that may improve a country's institutional standards.

References

[1] Aghion, Philippe, and Peter Howitt (1992) 'A Model of Growth through Creative Destruction,' *Econometrica*, **60** (2): 323–51.

[2] Aghion, Philippe, and Peter Howitt (2006) 'Joseph Schumpeter lecture: Appropriate growth policy: A unifying framework,' *Journal of the European Economic Association*, **4** (2-3): 269 –314.

[3] Aghion, Philippe, Richard Blundell, Rachel Griffith, Peter Howitt and Susanne Prantl (2009) 'The effects of entry on incumbent innovation and productivity,' *Review of Economics and Statistics*, **91** (1): 20–32.

[4] Alesina, Alberto, Silvia Ardagna, Giuseppe Nicoletti and Fabio Schiantarelli (2005) 'Regulation and investment,' *Journal of the European Economic Association*, **3** (4): 791–825.

[5] Appelbaum, Elie, and Eliakim Katz (1996) 'Corporate Taxation, Incumbency Advantage and Entry,' *European Economic Review*, **40**: 1817–28.

[6] Barrios, Salvador , Harry Huizinga, Luc Laeven, and Gaëtan Nicodème (2008) 'International Taxation and Multinational Firm Location Decisions,' CEPR Discussion Paper 7047.

[7] Baum, Christopher, Mark Schaffer and Steven Stillman (2007) 'Enhanced routines for instrumental variables/GMM estimation and testing,' *STATA Journal*, **7** (4): 465–506.

[8] Beach, William, and Tim Kane (2007) 'Methodology: Measuring the 10 Economic Freedoms,' available at www. heritage. org

[9] Besley, Timothy (1989) 'Commodity Taxation and Imperfect Competition,' *Journal of Public Economics*, **40**, 359–367.

[10] Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh (2001) 'New tools in comparative political economy: The Database of Political Institutions,' *World Bank Economic Review*, **15**(1): 165–176.

[11] Bénassy-Quéré, Agnès, Lionel Fontagné, and Amina Lahrèche-Révil (2005) 'How Does FDI React to Corporate Taxation?' *International Tax and Public Finance*, **12**: 583–603.

[12] Bertrand, Marianne, and Francis Kramarz (2002) 'Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry,' *The Quarterly Journal of Economics* **117** (4): 1369–413.

[13] Bertrand, Marianne, Antoinette Schoar and David Thesmar (2007) 'Banking deregulation and industry structure: Evidence from the French banking reforms of 1985,' *Journal of Finance*, **57** (2): 597–628.

[14] Buettner, Thiess, and Martin Ruf (2007) 'Tax incentives and the location of FDI: Evidence from a panel of German multinationals,' *International Tax and Public Finance*, **14**: 151–164.

[15] Cabral, Luís, and José Mata (2003) 'On the Evolution of the Firm Size Distribution: Facts and Theory,' *American Economic Review,* **93** (4): 1075–1090.

[16] Ciccone, Antonio, and Elias Papaioannou (2007) 'Red Tape and Delayed Entry,' *Journal of the European Economic Association*, **5** (2-3): 444–458.

[17] Cragg, John, and Stephen Donald (1993) 'Testing identifiability and specification in instrumental variables models,' *Econometric Theory*, **9**: 222 – 240.

[18] Cullen, Julie, and Roger Gordon (2007) 'Taxes and Entrepreneurial Activity: Theory and Evidence for the U.S,' *Journal of Public Economics*, **91** (7-8): 1479–1505.

[19] Da Rin, Marco, Giovanna Nicondano, and Alessandro Sembenelli (2005) 'Public Policy and the Creation of Active Venture Capital Markets,' *Journal of Public Economics*, **80** (8-9): 1699–723.

[20] Demirgüç-Kunt, Asli, Inessa Love, and Vojislav Maksimovic (2006) 'Business Environment and the Incorporation Decision,' *Journal of Banking and Finance*, **30** (5): 2967–93.

[21] Desai, Mihir, Paul Gompers and Josh Lerner (2003) 'Institutions, capital constraints and entrepreneurial firm dynamics: evidence from Europe,' NBER Working Paper 10165.

[22] Devereux, Michael, and Rachel Griffith (1998a) 'Taxes and the location of production: evidence from a panel of US multinationals,' *Journal of Public Economics*, **68** (1): 335–67.

[23] Devereux, Michael, and Rachel Griffith (1998b) 'The Taxation of Discrete Investment Choices,' IFS Working Paper N. 98/16.

[24] Devereux, Michael, and Rachel Griffith (2003) 'Evaluating tax policy for location decision,' *International Tax and Public Finance*, **10**: 107–26.

[25] Djankov, Simeon, Tim Ganser, Caralee McLiesh, Rita Ramalho, and Andrei Shleifer (2008) 'The effect of corporate taxes on investment and entrepreneurship,' NBER Working Paper n. 13756.

[26] Djankov, Simeon, Rafael Laporta, Florencio Lopez-de-Silanes, and Andrei Shleifer (2002) 'The Regulation of Entry,' *Quarterly Journal of Economics*, **117** (1): 1–37.

[27] Egger, Peter, Christian, Keuschnigg, and Hannes Winner (2009) 'Incorporation and Taxation: Theory and Firm-Level Evidence,' CES-Ifo Working Paper 2685.

[28] European Commission (2001) 'Company Taxation in the Internal Market', European Commission Staff Working Paper COM(2001)582.

[29] Gentry, William, and Glenn Hubbard (2004) 'Tax Policy and Entry into Entrepreneurship,' mimeo, Columbia University.

[30] Georgellis, Yannis, and Howard Wall (2006) 'Entrepreneurship and the Policy Environment,' *Federal Reserve Bank of St. Louis Review*, **88** (2): 95–111.

[31] Giannetti, Mariassunta, and Steven Ongena (2009) 'Financial Integration and Entrepreneurial Activity. Evidence from Foreign Bank Entry in Emerging Markets,' *The Review of Finance*, **13** (2): 181–223.

[32] Griffith, Rachel, Rupert Harrison and Gareth Macartney (2007) 'Product market reforms, labour market institutions and unemployment,' *The Economic Journal*, **117** (519): C142–C166.

[33] Hause, John, and Gunnar du Rietz (1984) 'Entry, Industry Growth, and the Microdynamics of Industry Supply,' *Journal of Political Economy*, **92**, 733–57.

[34] Keuschnigg, Christian (2008) 'Corporate Taxation and the Welfare State,' Oxford University Center for Business Taxation WP 813.

[35] King, Mervyn., and Don Fullerton (1984) *The taxation of income from capital*, University of Chicago Press, Chicago.

[36] Klapper, Leora, Luc Laeven and Raghuram Rajan (2006) 'Entry Regulation as a Barrier to Entrepreneurship,' *Journal of Financial Economics* **82** (3): 591–629.

[37] Kleibergen, Frank, and Richard Paap (2006) 'Generalized reduced rank tests using the singular value decomposition,' *Journal of Econometrics*, **127**(1): 97–126.

[38] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1998) 'Law and Finance,' *Journal of Political Economy*, **106** (6): 1133–1155.

[39] MacKie-Mason, Jeffrey, and Roger Gordon (1997) 'How Much Do Taxes Discourage Incorporation?' *Journal of Finance*, **52** (2): 477–505.

[40] Milesi-Ferretti, Gian Maria, Roberto Perotti, and Massimo Rostagno (2002) 'Electoral Systems and Public Spending,' *Quarterly Journal of Economics* **117** (2): 609–657.

[41] Nicoletti, Giuseppe and Stefano Scarpetta (2003) 'Regulation, productivity and growth: OECD evidence,' *Economic Policy*, **18** (36): 9–72.

[42] Pagano, Marco, and Paolo Volpin (2005) 'The Political Economy of Corporate Governance,' *American Economic Review*, **95** (4): 1005–1030.

[43] Perotti, Enrico and Paolo Volpin (2007) 'Investor Protection and Entry,' Tinbergen Institute Discussion Papers 07-006/2, Tinbergen Institute.

[44] Persson, Torsten, and Guido Tabellini (2004) 'Constitutional Rules and Fiscal Policy Outcomes,' *American Economic Review,* **94** (1): 25–45.

[45] Pfann, Gerard, and Hans van Kranenburg (2003) 'Tax Policy, Location Choices, and Market Structure,' *Journal of Law and Economics,* **46** (1), 61–86.

[46] Romer, Paul (1994) 'New Goods, Old Theory, and the Welfare Cost of Trade Restrictions, *Journal of Development Economics*, **43** (1), 5–38.

[47] Schumpeter, Joseph (1982 [1911]) *The Theory of Economic Development*, Edison, NJ, Transition Books.

[48] Schumpeter, Joseph (1975 [1942]) *Capitalism, Socialism, and Democracy*, New York, NY Harper.

[49] Slemrod, Joel (2004) 'Are Corporate Tax Rates, or Countries, Converging?' *Journal of Public Economics*, **88** (6): 1169–1186.

[50] Stock, James, and Motohiro Yogo (2005) 'Testing Instruments in Linear IV Regressions,' in D.W. Andrews and James Stock (Eds.) *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothemberg*, Cambridge, Cambridge University Press.

[51] Wooldridge, Jeffrey (2006), 'Cluster-sample Methods in Applied Econometrics: An Extended Analysis,' mimeo, Michigan State University.

Table 1. Variable definitions

This Table describes all the variables used in the analysis.

VARIABLE	DEFINITION AND SOURCES
ENTRY–COUNTRY	*Definition:* For each year t and country c, we identify: (a) all companies whose date of incorporation is $t-3$, and (b) all companies whose date of incorporation precedes year $t-3$ that are still active in year $t-3$. A company is considered to be active in year $t-3$ if it reports accounting data for at least one of the following: total assets, total sales, operating profits, number or cost of employees. The entry rate is computed as the ratio of (a) over (b). *Source:* Bureau van Dijk's Amadeus database, 2000–2007 December issues.
ENTRY–COUNTRY–INDUSTRY	*Definition:* For each year t, country c, and industry i, we identify: (a) all companies whose date of incorporation is $t-3$, and (b) all companies in country c and industry i whose date of incorporation precedes year $t-3$ that are still active in year $t-3$. A company is considered to be active in year $t-3$ if it reports accounting data for at least one of the following: total assets, total sales, operating profits, number or cost of employees. We drop industries with less than 5 companies. *Source:* Bureau van Dijk's Amadeus database, 2000–2007 December issues.
TAX–EATR; TAX–EATR–SQ	*Definition:* The Effective Average Tax Rate is defined by Devereux and Griffith (1998b) as the proportional reduction in a project's profitability rate that follows the taxation of the income stream generated by the project. If R^* denotes the project's pre-tax net present value, and R its after-tax net present value, TAX–EATR $\equiv (R^* - R)/R^*$. We compute TAX–EATR under the following assumptions: (a) the statutory corporate tax rates do not include local or municipal taxes, and other supplementary charges; (b) the industry-specific profitability rate equals that industry's profitability rate in the US, computed for each industry-year as: (Total Value Added – Total Labor Cost)/Total Value Added, using data from OECD's STAN database; (c) the investment is financed fully by new shares issue; (d) personal taxation of interest income, dividends and capital gains is not included; (e) the inflation rate is the country-specific inflation rate reported each year by Eurostat; (f) the nominal interest rate is the one-year interest rate on public bonds, reported by the Bulletin of the European Central Bank; (g) the economic depreciation rate is set equal to 12.5%; (h) the fiscal depreciation rates are those reported, for each country and year, by the "Worldwide Corporate Tax Guide" for plant and machinery. TAX–EATR–SQ is the squared Effective Average Tax Rate. *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide," Eurostat, ECB Bulletin, and OECD STAN database.

TAX–EATR–LOCAL; TAX–EATR–LOCAL–SQ	*Definition:* Computed as TAX–EATR but with the inclusion of local and municipal taxes, and other supplementary charges. TAX–EATR–LOCAL–SQ is the square of TAX–EATR–LOCAL. *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide," Eurostat, ECB Bulletin, and OECD STAN database.
TAX–EATR–DEBT; TAX–EATR–DEBT–SQ	*Definition:* Computed as TAX–EATR but assuming that the investment is financed fully by debt. TAX–EATR–DEBT–SQ is the square of TAX–EATR–DEBT. *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide," Eurostat, ECB Bulletin, and OECD STAN database.
TAX–EATR–PERSONAL; TAX–EATR–PERSONAL–SQ	*Definition:* Computed as TAX–EATR but including personal taxation. TAX–EATR–PERSONAL–SQ is the square of TAX–EATR–PERSONAL. *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide," and "The Global Executive Guide," Eurostat, ECB Bulletin, and OECD STAN database.
CARRY–FWD	*Definition:* Equals the number of years income losses can be carried forward to future fiscal years for taxation purposes. When losses can be carried forward indefinitely, we assign the maximum number observed in the sample, equal to 15. *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide."
CARRY–BACK	*Definition:* Equals the number of years income losses can be used to obtain a tax credit on taxes paied on past income ('carried back'). *Source:* Authors' computation on data from Ernst & Young's "Worldwide Corporate Tax Guide."
PRO-BUSINESS–POLICY	*Definition:* It is the average of the nine policy factor scores built by the Heritage Foundation. These include: business regulation, international trade regulation, tax burden, extent of public ownership, price stability, regulation of financial institutions, regulation of foreign investments, quality of property rights and anti-corruption enforement. The index ranges from 0 (minimum economic freedom) to 100 (maximum economic freedom). Each component score is based on national and international data, economic indicators, and opinions of a panel of academic advisors. *Source:* Economic Freedom Index, published by the Heritage Foundation and the Wall Street Journal (www.heritage.org), various years.
PERCEPTION–TAX	*Definition:* Survey-based measure which answers the question: Do corporate taxes discourage entrepreneurial activity? It ranges from 0 (the tax system does not discourage entrepreneurial activity) to 10 (the tax system discourages entrepreneurial activity).

	Source: World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
ANTITRUST–REGULATION	*Definition:* Survey-based measure which answers the question: Are antitrust laws efficient in preventing unfair competition? It ranges from 0 (no, antitrust laws do not prevent unfair competition) to 10 (yes, antitrust laws prevent unfair competition) *Source:* World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
BUREAUCRACY	*Definition:* Survey-based measure which answers the question: Does bureaucracy hinder business development? It ranges from 0 (yes, bureaucracy hinders business development) to 10 (no, bureaucracy does not hinder business development) *Source:* World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
CORRUPTION	*Definition:* Survey-based measure which answers the question: Do improper practices such as bribing or corruption prevail in the public sphere? It ranges from 0 (yes, bribing or corruption prevail in the public sphere) to 10 (no, bribing or corruption do not prevail in the public sphere) *Source:* World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
LABOUR–REGULATION	*Definition:* Survey-based measure which answers the question: Do labor regulations (hiring/firing practices, minimum wages, etc.) hinder business activities? It ranges from 0 (yes, labor regulations hinder business activities) to 10 (no, labor regulations do not hinder business activities) *Source:* World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
ACCESS–CAPITAL	*Definition:* Survey-based measure which answers the question: Are capital markets (foreign and domestic) easily accessible? It ranges from 0 (no, capital market are not accessible) to 10 (yes, capital market are accessible) *Source:* World Competitiveness Yearbook, published by the International Institute for Management Development (www.imd.ch/wcy), various years.
ACCOUNTING–GOOD; ACCOUNTING–BAD	*Definition:* ACCOUNTING–GOOD is a dummy variables that equals 1 for Finland, France, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, and the UK, and equals 0 for all other countries. ACCOUNTING–BAD is a dummy variable that equals 1 for Austria, Belgium, Denmark, Germany, Greece, Ireland, Italy, and Portugal, and equals 0 for all other countries.

	Source: LaPorta et al. (1998)
VETO–POWER	*Definition:* It is a variable that counts the number of players with veto power present in a political system; it is computed yearly. For presidential systems, it counts the number of players with veto power, considering the executive and legislative powers separately only if they are controlled by different parties. For parliamentary systems, it counts the number of parties in the government coalition. The measure also takes into account the effect that certain electoral rules (e.g., closed versus open list) have on the cohesiveness of governing coalitions. *Source:* World Bank's Database of Political Institutions, described by Beck et al. (2001).
GOV–STABILITY	*Definition:* It is a survey-based measure assessing both the governments ability to carry out its declared program, and its ability to stay in office. It ranges from 0 (low stability) to 12 (high stability); it is computed yearly. *Source:* International Country Risk Guide, published by The PRS Group Inc. (www.prsgroup.com), various years.
GOV–CENTER–LEFT	*Definition:* It is a dummy variable that equals 1 if the chief executive party is a center-left-wing party and 0 otherwise; it is computed yearly. *Source:* World Bank's Database of Political Institutions, described by Beck et al. (2001).
GOV–FRAGMENTATION	*Definition:* It is the Herfindahl index for a country's political parties, computed as the sum of the squared seat shares of all parties in the parliament, and is computed yearly. *Source:* World Bank's Database of Political Institutions, described by Beck et al. (2001).
ELECTION–DATE	*Definition:* It is a dummy variable equal to one for all years when legislative elections took place in a given country. *Source:* The European parliamentary elections and political parties database, www.parties-and-elections.de.

Table 2. Descriptive statistics

This Table reports summary statistics for the sample of 17 EU countries observed over the 1997–2004 time period. Variables are defined in Table 1. PERCEPTION–TAX is missing for 1997. For variables that do not vary over industries the descriptive statistics are reported with respect to the country-year dimensions.

Variable	Mean	S.D.	25th perc.	Median	75th perc.	*Observations*
ENTRY–COUNTRY	8.27	5.07	5.47	8.08	10.11	*134*
ENTRY–COUNTRY–INDUSTRY	7.02	6.68	3.29	5.59	8.91	*4,805*
TAX–EATR	30.08	4.99	27.57	30.04	33.44	*4,805*
TAX–EATR–LOCAL	31.55	6.14	28.25	31.33	34.73	*4,805*
TAX–EATR–DEBT	26.67	5.83	23.89	27.03	30.49	*4,805*
TAX–EATR–PERSONAL	40.70	16.99	24.95	47.58	51.77	*4,805*
PRO–BUSINESS–POLICY	69.68	5.88	65.70	68.80	74.40	*134*
CARRY–FWD	10.66	4.34	6	10	15	*134*
CARRY–BACK	0.56	1.03	0	0	1	*134*
PERCEPTION–TAX	5.44	1.36	4.18	5.57	6.50	*119*
ANTRITRUST–REGULATION	6.38	0.88	5.70	6.45	7.00	*134*
BUREAUCRACY	3.96	1.52	2.68	3.88	5.33	*134*
CORRUPTION	6.39	2.01	5.09	6.79	7.84	*134*
LABOUR–REGULATION	4.36	1.61	3.15	4.05	5.20	*134*
ACCESS–CAPITAL	8.49	0.54	8.10	8.51	8.90	*134*

Table 3. Descriptive statistics, by country

This Table reports summary statistics for the entry rates and for the two main independent variables, for the 17 EU countries observed over the 1997–2004 time period. Variables are defined in Table 1.

	ENTRY–COUNTRY		ENTRY–COUNTRY–IND.		TAX–EATR		PRO-BUSINESS–POLICY		
Country	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	*Observations*
Austria	12.01	2.99	11.80	10.90	30.40	2.38	69.66	1.48	*295*
Belgium	7.36	0.79	6.57	5.21	34.44	3.18	69.19	0.46	*312*
Denmark	11.78	1.61	10.10	8.18	31.79	1.60	70.45	4.28	*306*
Finland	5.87	1.58	5.29	3.64	27.56	1.48	70.61	3.43	*299*
France	9.57	0.79	7.61	4.25	31.15	2.65	62.30	1.74	*304*
Germany	9.62	1.55	8.50	5.31	33.13	8.70	67.99	3.32	*312*
Greece	8.45	1.40	8.45	7.22	32.99	2.25	58.47	1.47	*298*
Ireland	6.73	4.82	5.34	5.88	19.46	6.53	79.32	2.39	*215*
Italy	2.40	2.73	2.05	2.60	33.45	1.77	65.04	0.76	*312*
Luxembourg	3.73	2.34	2.80	3.99	27.62	3.53	77.18	2.94	*146*
Netherlands	4.72	0.90	4.58	3.31	32.67	1.60	73.00	1.80	*304*
Norway	9.86	1.75	9.42	6.68	27.80	0.66	67.47	1.24	*304*
Portugal	5.72	1.78	5.12	4.60	28.03	3.01	65.55	0.48	*282*
Spain	8.16	1.72	7.07	7.13	35.00	1.05	66.54	1.84	*312*
Sweden	6.59	1.04	5.71	4.54	25.01	2.04	69.45	3.17	*302*
Switzerland	10.48	12.89	4.47	6.72	26.31	2.32	77.64	0.97	*268*
UK	18.67	3.36	12.97	6.54	28.77	1.36	78.03	0.39	*234*

Table 4. Main estimation results

This table presents our main results. The dependent variable is ENTRY–COUNTRY–INDUSTRY in columns (1) and (2), and TAX–EATR in column (3). The independent variables are defined in Table 1. Column (1) reports results from the within-group regression. Column (2) reports results for the GMM within-group regression where TAX–EATR and TAX–EATR–SQ are instrumented. Column (3) presents the (pseudo) first stage regression corresponding to column (2). Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

	(1) WG	(2) GMM-IV	(3) FIRST-STAGE
TAX–EATR	-0.886***	-3.417***	
	(0.16)	*(0.58)*	
TAX–EATR–SQ	0.015***	0.053***	
	(0.00)	*(0.01)*	
PRO–BUSINESS–POLICY	0.127***	0.057	-0.396***
	(0.04)	*(0.05)*	*(0.03)*
GOV–CENTER–LEFT			-2.596***
			(0.21)
VETO–POWER			0.622***
			(0.07)
GOV–STABILITY			-0.337***
			(0.08)
ELECTION–DATE			-0.541***
			(0.08)
Time dummies	Yes	Yes	Yes
Wald test on regressors	94.47	78.88	380.06
degrees of freedom [p-value]	10 [0.00]	10 [0.00]	12 [0.00]
Wald test on time dummies	31.83	51.35	81.65
degrees of freedom [p-value]	7 [0.00]	7 [0.00]	7 [0.00]
Hansen J Statistic		3.31	
degrees of freedom [p-value]		2 [0.19]	
Endogeneity Test (Hansen C Statistic)		0.50	
degrees of freedom [p-value]		1 [0.48]	
Cragg-Donald Statistic		29.91	
Kleibergen-Paap Statistic		20.07	
Observations	4,805	4,805	4,805

Table 5. Estimation results including tax provisions for new businesses

This table presents additional results where we include taxation provisions for new businesses. The dependent variable is ENTRY–COUNTRY–INDUSTRY. The independent variables are defined in Table 1. Column (1) reports results from the within-group regression, column (2) reports results for the GMM within-group regression where TAX–EATR, TAX–EATR–SQ, CARRY–FWD and CARRY–BACK are instrumented (the equation is exactly identified). Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

	(1) WG	(2) GMM-IV
TAX–EATR	-0.717***	-3.739***
	(0.19)	*(0.72)*
TAX–EATR–SQ	0.011***	0.063***
	(0.00)	*(0.01)*
PRO–BUSINESS–POLICY	0.116***	0.066
	(0.04)	*(0.05)*
CARRY–FWD	0.089	0.428*
	(0.08)	*(0.24)*
CARRY–BACK	1.967**	-7.687
	(0.88)	*(6.08)*
Time dummies	Yes	Yes
Wald test on regressors	128.68	80.73
degrees of freedom [p-value]	12 [0.00]	12 [0.00]
Wald test on time dummies	27.37	40.56
degrees of freedom [p-value]	7 [0.00]	7 [0.00]
Hansen J Statistic		–
degrees of freedom [p-value]		
Endogeneity Test (Hansen C Statistic)		–
degrees of freedom [p-value]		
Cragg-Donald Statistic		15.39
Kleibergen-Paap Statistic		26.11
Observations	4,805	4,805

Table 6. Estimation results controlling for additional policy dimensions

This table presents results for additional policy dimensions. The dependent variable is ENTRY–COUNTRY–INDUSTRY. The independent variables are defined in Table 1. All columns report results for the GMM within-group regression where TAX–EATR and TAX–EATR–SQ are instrumented. Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

	(1)	(2)	(3)	(4)	(5)
	GMM-IV	GMM-IV	GMM-IV	GMM-IV	GMM-IV
TAX–EATR	-3.615***	-3.039***	-3.286***	-3.060***	-3.510***
	(0.57)	*(0.45)*	*(0.43)*	*(0.50)*	*(0.57)*
TAX–EATR–SQ	0.056***	0.047***	0.051***	0.047***	0.054***
	(0.01)	*(0.01)*	*(0.01)*	*(0.01)*	*(0.01)*
ANTRITRUST–REGULATION	0.158				
	(0.23)				
BUREAUCRACY		0.734***			
		(0.17)			
CORRUPTION			0.463***		
			(0.17)		
LABOUR–REGULATION				0.334*	
				(0.18)	
ACCESS–CAPITAL					0.429
					(0.36)
Time dummies	Yes	Yes	Yes	Yes	Yes
Wald test on regressors	73.12	81.57	97.08	77.35	90.25
degrees of freedom [p-value]	10 [0.00]	10 [0.00]	10 [0.00]	10 [0.00]	10 [0.00]
Wald test on time dummies	50.28	47.84	52.22	46.28	48.27
degrees of freedom [p-value]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]
Hansen J Statistic	3.16	0.60	0.98	2.90	3.12
degrees of freedom [p-value]	2 [0.21]	2 [0.74]	2 [0.61]	2 [0.23]	2 [0.21]
Endogeneity Test (Hansen C Statistic)	3.01	0.60	0.39	2.76	1.99
degrees of freedom [p-value]	1 [0.08]	1 [0.44]	1 [0.53]	1 [0.10]	1 [0.16]
Cragg-Donald Statistic	32.45	54.39	67.07	42.60	32.23
Kleibergen-Paap Statistic	20.55	25.65	29.70	29.05	19.15
Observations	4,805	4,805	4,805	4,805	4,805

Table 7. Estimation results controlling for the quality of accounting standards

This table presents results where we distinguish between countries with above average and below average quality of accounting standards. The dependent variable is ENTRY–COUNTRY–INDUSTRY in columns (1) and (2), TAX–EATR⋆ACCOUNTING–GOOD in column (3), and TAX–EATR⋆ACCOUNTING–BAD in column (4). The independent variables are defined in Table 1. Column (1) reports results from the within-group regression, column (2) reports results for the GMM within-group regression where TAX–EATR and TAX–EATR–SQ are instrumented, while columns (3) and (4) present the pseudo first stage regressions corresponding to column (2). Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***.

	(1) WG	(2) GMM-IV	(3) FIRST-STAGE *ACCOUNT.–GOOD*	(4) FIRST-STAGE *ACCOUNT.–BAD*
TAX–EATR⋆ACCOUNTING–GOOD	-0.647	-7.480***		
	(0.40)	*(2.11)*		
TAX–EATR⋆ACCOUNTING–BAD	-0.905***	-3.043***		
	(0.18)	*(0.46)*		
(TAX–EATR⋆ACCOUNTING–GOOD)–SQ	0.010	0.132***		
	(0.01)	*(0.03)*		
(TAX–EATR⋆ACCOUNTING–BAD)–SQ	0.015***	0.049***		
	(0.00)	*(0.01)*		
PRO–BUSINESS–POLICY	0.125***	0.137***	-0.034***	-0.308***
	(0.04)	*(0.04)*	*(0.01)*	*(0.02)*
GOV–CENTER–LEFT⋆ACCOUNTING–GOOD			-0.465***	-0.989***
			(0.11)	*(0.10)*
VETO–POWER⋆ACCOUNTING–GOOD			-0.097**	0.154***
			(0.04)	*(0.05)*
GOV–STABILITY⋆ACCOUNTING–GOOD			0.212***	-0.244***
			(0.04)	*(0.05)*
ELECTION–DATE⋆ACCOUNTING–GOOD			0.289***	0.135**
			(0.05)	*(0.06)*
GOV–CENTER–LEFT⋆ACCOUNTING–BAD			0.134***	-3.830***
			(0.03)	*(0.27)*
VETO–POWER⋆ACCOUNTING–BAD			0.330***	1.109***
			(0.02)	*(0.11)*
GOV–STABILITY⋆ACCOUNTING–BAD			0.082***	-0.736***
			(0.02)	*(0.10)*
ELECTION–DATE⋆ACCOUNTING–BAD			-0.113***	-1.337***
			(0.03)	*(0.12)*
Time dummies	Yes	Yes	Yes	Yes
Wald test on regressors	103.29	140.46	540.12	645.66
degrees of freedom [p-value]	12 [0.00]	12 [0.00]	16 [0.00]	16 [0.00]
Wald test on time dummies	30.39	56.06	466.20	254.37
degrees of freedom [p-value]	7 [0.00]	7 [0.31]	7 [0.08]	7 [0.08]
Hansen J Statistic		2.64		
degrees of freedom [p-value]		4 [0.62]		
Endogeneity Test (Hansen C Statistic)		0.10		
degrees of freedom [p-value]		1 [0.75]		
Cragg-Donald Statistic		7.51		
Kleibergen-Paap Statistic		9.56		
Observations	4,805	4,805	4,805	4,805

Table 8. Estimation results using alternative tax measures

This table presents results for alternative tax measures. The dependent variable is ENTRY–COUNTRY–INDUSTRY in columns (1), (2), (4), (5), (7), and (8), and TAX–EATR in columns (3), (6), and (9). The independent variables are defined in Table 1. Columns (1), (4), and (7) report results from the within-group regression, columns (2), (5), and (8) report results for the GMM within-group regression where TAX–EATR and TAX–EATR–SQ are instrumented, while columns (3), (6), and (9) present the corresponding pseudo first stage regressions. Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

Table 8. Estimation results using alternative tax measures (continued)

	(1) WG	(2) GMM-IV	(3) FIRST-STAGE	(4) WG	(5) GMM-IV	(6) FIRST-STAGE	(7) WG	(8) GMM-IV	(9) FIRST-STAGE
TAX–EATR–LOCAL	-0.641***	-2.379***							
	(0.10)	*(0.42)*							
TAX–EATR–LOCAL–SQ	0.009***	0.029***							
	(0.00)	*(0.00)*							
TAX–EATR–DEBT				-0.103**	-3.303***				
				(0.05)	*(0.84)*				
TAX–EATR–DEBT–SQ				0.002***	0.055***				
				(0.00)	*(0.01)*				
TAX–EATR–PERSONAL							0.050	-3.187	
							(0.04)	*(5.77)*	
TAX–EATR–PERSONAL–SQ							-0.000	0.036	
							(0.00)	*(0.07)*	
PRO–BUSINESS–POLICY	0.130***	0.035	-0.419***	0.130***	0.017	-0.337***	0.121***	-0.413	0.110**
	(0.04)	*(0.05)*	*(0.03)*	*(0.04)*	*(0.07)*	*(0.03)*	*(0.04)*	*(0.94)*	*(0.05)*
GOV–CENTER–LEFT			-3.580***			-2.135***			-3.302***
			(0.26)			*(0.25)*			*(0.43)*
VETO–POWER			0.508***			0.539***			
			(0.07)			*(0.09)*			
GOV–STABILITY			-0.380***			-0.292***			-1.389***
			(0.08)			*(0.09)*			*(0.18)*
ELECTION–DATE			-0.223**			-0.687***			
			(0.09)			*(0.11)*			
GOV–FRAGMENTATION									-25.826***
									(4.67)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald test on regressors	119.46	78.96	338.93	59.58	35.80	271.43	57.60	7.29	484.80
degrees of freedom [p-value]	10 [0.00]	10 [0.00]	12 [0.00]	10 [0.00]	10 [0.00]	12 [0.00]	10 [0.00]	10 [0.00]	11 [0.00]
Wald test on time dummies	30.69	46.38	176.30	29.41	24.39	135.38	34.77	5.47	235.57
degrees of freedom [p-value]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]	7 [0.00]
Hansen J Statistic		3.26			0.17			3.66	
degrees of freedom [p-value]		2 [0.20]			2 [0.92]			1 [0.06]	
Endogeneity Test (Hansen C Statistic)		1.24			0.00			3.66	
degrees of freedom [p-value]		1 [0.27]			1 [0.95]			1 [0.06]	
Cragg-Donald Statistic		30.28			4.31			0.44	
Kleibergen-Paap Statistic		18.71			4.69			0.39	
Observations	4,805	4,805	4,805	4,805	4,805	4,805	4,805	4,805	4,805

Table 9. Robustness: Estimation results for taxation perception

This table presents results for an alternative qualitative tax measure. The dependent variable is ENTRY–COUNTRY–INDUSTRY in columns (1) and (2), and PERCEPTION–TAX in column (3). The independent variables are defined in Table 1. Column (1) reports results from the within-group regression, column (2) reports results for the GMM within-group regression where PERCEPTION–TAX is instrumented, while column (3) presents the pseudo first stage regression corresponding to column (2). Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

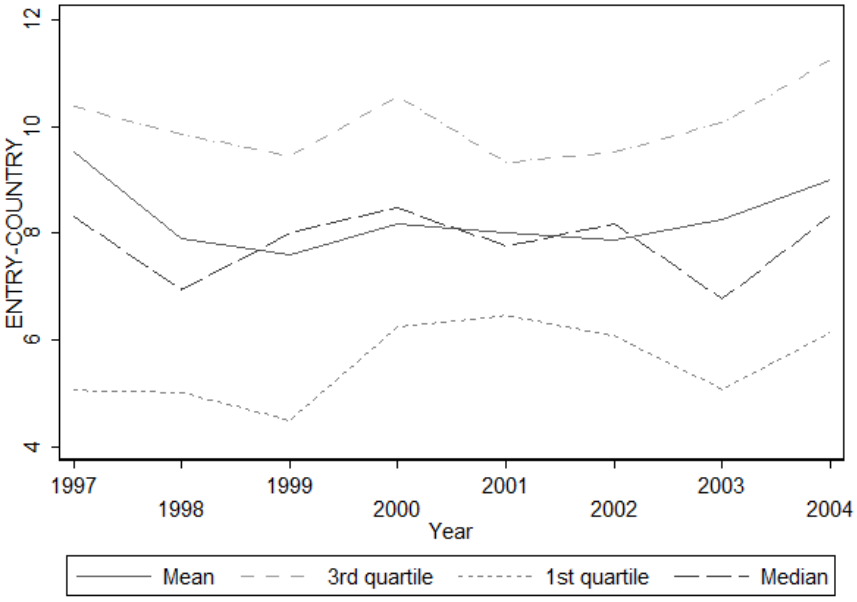
	(1) WG	(2) GMM-IV	(3) FIRST-STAGE
PERCEPTION–TAX	-0.353***	-1.335***	
	(0.13)	*(0.33)*	
PRO–BUSINESS–POLICY	0.102**	0.011	-0.068***
	(0.04)	*(0.04)*	*(0.00)*
GOV–CENTER–LEFT			0.082***
			(0.03)
VETO–POWER			0.184***
			(0.01)
GOV–STABILITY			-0.200***
			(0.01)
ELECTION–DATE			0.005
			(0.02)
Time dummies	Yes	Yes	Yes
Wald test on regressors	40.33	39.47	5071.99
degrees of freedom [p-value]	7 [0.00]	7 [0.00]	10 [0.00]
Wald test on time dummies	28.50	31.56	1582.20
degrees of freedom [p-value]	5 [0.00]	5 [0.00]	5 [0.00]
Hansen J Statistic		47.94	
degrees of freedom [p-value]		3 [0.00]	
Endogeneity Test (Hansen C Statistic)		0.75	
degrees of freedom [p-value]		1 [0.39]	
Cragg-Donald Statistic		158.25	
Kleibergen-Paap Statistic		190.07	
Observations	3,727	3,727	3,727

Table 10. Robustness: Estimation results when PRO–BUSINESS–POLICY is instrumented

This table presents results where both the tax measures and the PRO–BUSINESS–POLICY index are instrumented. The dependent variable is ENTRY–COUNTRY–INDUSTRY in column (1), TAX–EATR in column (2), and PRO-BUSINESS–POLICY in column (3). The independent variables are defined in Table 1. Column (1) reports results for the GMM within-group regression where TAX–EATR, TAX–EATR–SQ, and PRO–BUSINESS–POLICY are instrumented, while columns (2) and (3) present the pseudo first stage regressions corresponding to column (2). Time dummies are included but not displayed. Standard errors (shown in parenthesis) are robust to heteroscedasticity and autocorrelation. The reported tests for instrument validity and relevancy are discussed in Section 6.2. Coefficients significant at the 10%, 5% and 1% level are marked with *, **, and ***. Estimates are performed using the command `xtivreg2` for Stata 10 by Baum, Schaffer and Stillman (2007) and Schaffer (2007).

	(1) GMM-IV	(2) FIRST-STAGE *TAX–EATR*	(3) FIRST-STAGE *PRO-BUSIN.-POLICY*
TAX–EATR	-2.987***		
	(0.81)		
TAX–EATR–SQ	0.046***		
	(0.01)		
PRO–BUSINESS–POLICY	0.231		
	(0.25)		
GOV–CENTER–LEFT		-2.420***	-0.444***
		(0.22)	*(0.12)*
VETO–POWER		0.512***	0.278***
		(0.06)	*(0.05)*
GOV–STABILITY		-0.518***	0.457***
		(0.08)	*(0.05)*
ELECTION–DATE		-0.370***	-0.432***
		(0.08)	*(0.06)*
Time dummies	Yes	Yes	Yes
Wald test on regressors	77.10	228.64	972.48
degrees of freedom [p-value]	10 [0.00]	11 [0.00]	11 [0.00]
Wald test on time dummies	50.90	122.17	782.41
degrees of freedom [p-value]	7 [0.00]	7 [0.31]	7 [0.08]
Hansen J Statistic	2.83		
degrees of freedom [p-value]	2 [0.00]		
Endogeneity Test (Hansen C Statistic)	0.50		
degrees of freedom [p-value]	1 [0.48]		
Cragg-Donald Statistic	9.03		
Kleibergen-Paap Statistic	12.76		
Observations	4,805	4,805	4,805

a) Entry rates by country



b) Entry rates by country–industry

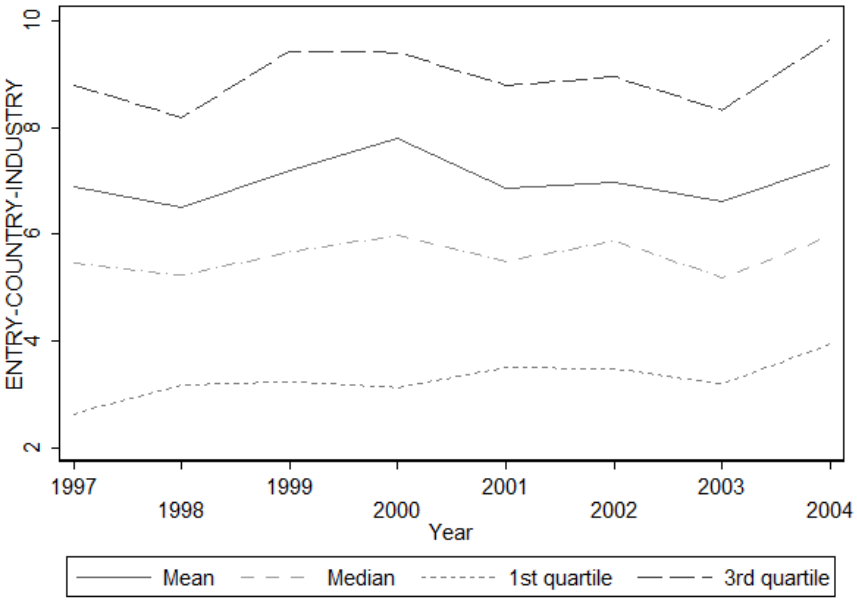


Figure 1: Entry rates by country and by country–industry (averaged over countries)

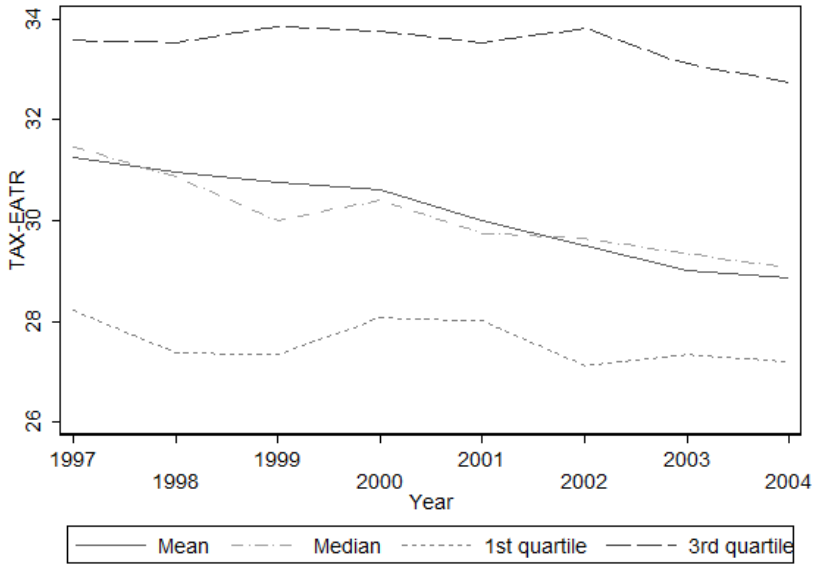


Figure 2: Effective tax rates (averaged over countries)

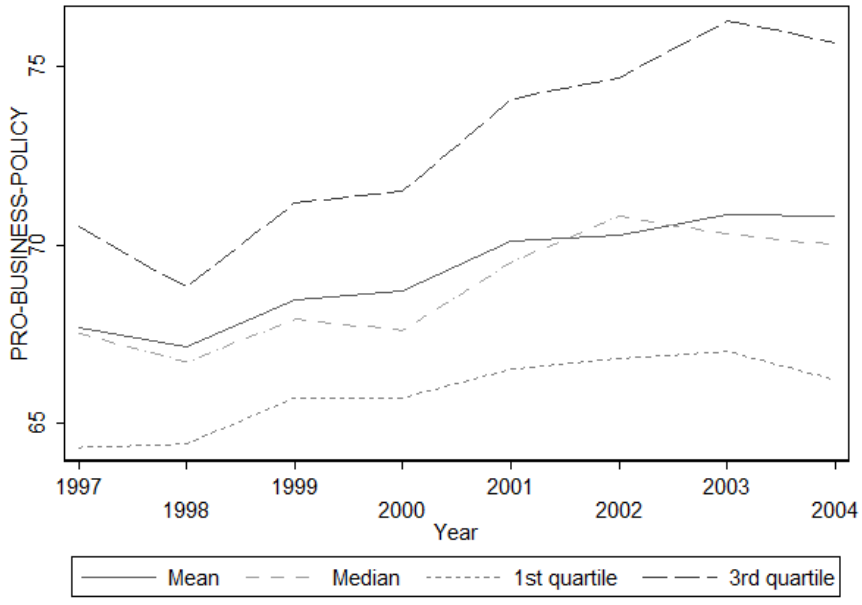


Figure 3: PRO–BUSINESS–POLICY scores (averaged over countries)

Appendix

Table A1. Entry Dataset Construction

This Table reports the criteria used in the construction of the entry dataset, which follows those of Klapper, Laeven, and Rajan (2006).

	COUNTRIES
Included	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.
	LEGAL FORMS
Included:	Corporations, e.g., AG, SA, NV, A/S, Plc, OYJ, AE, SpA, AB. Limited Liability Companies, e.g., GmbH, SPRL, BVBA, ApS, Ltd, OY, SARL, EPE, Srl, BV, A/S, LDA, SL.
Excluded:	Other legal forms: sole proprietorships, cooperatives, partnerships.
	INDUSTRIES (2-DIGIT NACE CODE LEVEL)
	Included:
Manufacturing	D: 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
Electricity, gas, water supply	E: 40, 41
Construction	F: 45
Wholesale and retail trade	G: 50, 51, 52
Hotels and restaurants	H: 55
Transport, storage, telecom	I: 60, 61, 62, 63, 64
Real estate, rental, bus. serv.	K: 70, 71, 72, 73, 74
	Excluded:
Agriculture	A: 01, 02
Fishing	B: 05
Mining	C: 10, 11, 12, 13, 14
Manufacturing	D: 37
Financial intermediation	J: 65, 66, 67
Public Administration	L: 75
Education	M: 80
Health and social work	N: 85
Other social and pers. serv.	O: 90, 91, 92, 93)
Activities of households	P: 95, 97
Extra-territorial organiz.	Q: 99
	CONSOLIDATION CODES
	Included:
C1	Consolidated statement without an unconsolidated companion
U1	Unconsolidated statement without a consolidated companion
U2	Unconsolidated statement with a consolidated companion
LF	Limited financial data, probably unconsolidated
NA	Not available
	Excluded:
C2	Consolidated statement with an unconsolidated companion

Computation of the effective average tax rate

The most general formula for EATR is (see Table A2 for variables' definitions):

$$EATR = \frac{R^* - R}{R^*} \tag{1}$$

In the denominator we substitute R^*, which can potentially be equal to zero, with the net present value of pre-tax income, obtaining the following formula, that we apply to our data:

$$EATR = \frac{R^* - R}{\frac{p}{1+r}} \tag{2}$$

where p is the financial return rate on the investment, r is the real interest rate, and:

$$R^* = \frac{p - r}{1 + r} \tag{3}$$

$$R = \frac{\gamma}{(1+\rho)}\{(p+\delta)(1+\pi)(1-\tau) - [(1+\rho) - (1-\delta)(1+\pi)](1-A)\} + F \tag{4}$$

$$\rho = \frac{(1-m^i)i}{(1-z)} \tag{5}$$

$$\gamma = \frac{(1-m^d)(1-c)}{(1-s)(1-z)} \tag{6}$$

$$A = \begin{cases} \phi\tau\dfrac{(1+\rho)}{\rho}\Big[1 - \dfrac{1}{(1+\rho)^{T+1}}\Big] & \text{with straight line depreciation, for } T = 1/\phi \\ \\ \dfrac{\phi\tau(1+\rho)}{\rho+\phi} & \text{with depreciation on a declining balance basis} \end{cases} \tag{7}$$

and

$$F = \begin{cases} F^{RE} = 0 & \text{if the project is financed by retained earnings} \\ \\ F^{NE} = \dfrac{-\rho(1-\gamma)}{1+\rho}(1-\phi\tau) & \text{if the project is financed by new equity} \\ \\ F^{DE} = \dfrac{\gamma(1-\phi\tau)}{1+\rho}[\rho - i(1-\tau)] & \text{if the project is financed by debt} \end{cases} \tag{8}$$

The TAX–EATR measures we employ in the paper are then obtained under the following assumptions:

- TAX–EATR assumes that all personal tax rates equal zero ($m^i = m^d = c = s = z = 0$) and that the project is financed by new equity ($F = F^{NE}$);
- TAX–EATR–LOCAL employs a measure of corporate taxation (τ) that includes local or municipal taxes and other charges. It assumes that all personal tax rates equal zero ($m^i = m^d = c = s = z = 0$) and that the project is financed by issuing new equity ($F = F^{NE}$);
- TAX–EATR–DEBT assumes that all personal tax rates equal zero ($m^i = m^d = c = s = z = 0$) and that the project is financed by debt ($F = F^{DE}$);
- TAX–EATR-PERSONAL: includes personal taxation, assuming that the project is financed by new equity ($F = F^{NE}$).

Table A2. Variables used to compute effective average tax rates

This Table reports the definitions and sources for the variables used for the computation of TAX–EATR, following Chennells and Griffith (1997), Devereux and Griffith (1998b), and European Commission (2001).

VARIABLE	DEFINITION AND SOURCES
τ	*Definition:* The statutory corporate income tax rate. In the baseline specification it does not include local or municipal taxes. *Source:* "Worldwide Corporate Tax Guide" by Ernst & Young.
m^i	*Definition:* The personal tax rate on interest income is the after-witholding tax rate on interest income from savings (e.g. bank accounts and deposits) and investments (e.g. bonds and securities). When rates on savings and investments differ, the maximum tax rate on investments is considered. In the computation we use the maximum marginal tax rate for a domestic resident. *Source:* "The Global Executive" tax guide by Ernst & Young.
m^d	*Definition:* The personal tax rate on dividend income is the after-witholding maximum tax rate on dividends. We consider the final maximum tax rate for a resident qualified shareholder. The definition of a qualified or substantial participation differs across the national jurisdictions and over time. *Source:* "The Global Executive" tax guide by Ernst & Young.
s	*Definition:* The rate of tax credit available on dividends, expressed as a proportion of gross dividends. It is available in the countries that adopt an imputation system where a share of corporate income taxes paid on distributed profits can be offset against personal income tax liabilities. *Source:* "The Global Executive" tax guide by Ernst & Young.
c	*Definition:* The rate of withholding tax on dividends paid by the firm to the shareholder. *Source:* "Worldwide Corporate Tax Guide" by Ernst & Young.
z	*Definition:* A shareholder's marginal personal capital gains tax rate. This is the tax rate on capital gains from the disposal of shares. We consider the marginal tax rate for a shareholder with a qualified participation in the corporation. The definition of a qualified participation differs across the national jurisdictions and over time. We use the maximum marginal tax rate for a domestic resident. *Source:* "The Global Executive" tax guide by Ernst & Young.

i	*Definition:* The nominal interest rate, equal to the rate on one-year government bonds. *Source:* European Central Bank Monthly Bulletin.
ϕ	*Definition:* The rate at which capital expenditure can be offset against taxes. In the baseline specification we use the maximum allowed fiscal depreciation rate for plant and machinery. *Source:* "Worldwide Corporate Tax Guide" by Ernst & Young.
π	*Definition:* The inflation rate, common to output and capital, given by the nominal increase in prices between periods t and $t+1$. *Source:* Harmonized Indices of Consumer Prices (HICPs) by Eurostat.
p	*Definition:* The financial rate of return on the investment. This profitability rate is computed for each industry-year pair in the US as: (Total Value Added – Total Labor Cost)/Total Value Added. *Source:* OECD STAN database for Industrial Analysis.
r	*Definition:* The real interest rate, $(1+r)(1+\pi) = (1+i)$. *Source:* Authors' coalculation.
δ	*Definition:* One period cost of depreciation. It is assumed equal to 12.5%. *Source:* Devereux, Griffith and Klemme (2002) and Yoo (2003).
A	*Definition:* The net present value of tax allowances per unit of investment. The cost of one unit of physical investment in period t is therefore $(1-A)$. *Source:* Authors' computation (see equation (7) above).
ρ	*Definition:* Shareholders' nominal discount rate. *Source:* Authors' computation (see equation (5) above).
γ	*Definition:* This parameter measures the tax wedge between the taxation of capital gains and dividends. *Source:* Authors' computation (see equation (6) above).
R	*Definition:* The after-tax net present value of the investment. It equals the net present value of earnings: $R_t = (1+\rho)dV_t = dD_t - dN_t + dV_{t+1}$. Her dD_t and dN_t are the changes in dividends and new equity issues in period t, respectively. V_t is the value of the firm in period t, that equals the net present value of after-tax earnings, and is given by: $V_t = [\gamma D_t - N_t + V_{t+1}]/(1+\rho)$. R_t consists of two parts: $R_t = R_t^{RE} + F_t$; where R_t^{RE} is the income attributable to the investment financed by retained earnings, while F_t is the additional cost of raising external finance *Source:* Authors' computation (see equation (4) above).

R^*	*Definition:* The pre-tax value of the investment. It is equal to $R_t^* = R_t^{*RE} + F_t^*$; where $F_t^* = 0$, because the net present value of the additional costs due to financing by new equity or debt is zero, while R_t^{*RE} can be simplified to $R_t^{*RE} = (p - r)/(1 + r)$, since in absence of taxes $\tau = A = 0$ and $\gamma = 1; \rho = i$ *Source:* Authors' computation (see equation (3) above).
F	*Definition:* The cost of raising external finance. *Source:* Authors' computation (see equation (8) above).
$\tilde{p}$	*Definition:* The internal rate of return to the project, obtained setting $R = 0$ and solving for p in equation (4). *Source:* Authors' computation (see equation (4) above).
$EATR$	*Definition:* It is the proportional difference between R_t^* and R_t. It is defined for $p \geq \tilde{p}$. *Source:* Authors' computation (see equation (2) above).

Table A3. Descriptive statistics for the variables used to compute TAX–EATR

This Table reports summary statistics for the 17 EU countries observed over the 1997–2004 time period. Variables are defined in Table A2, and are expressed in percentage terms.

Variable	Mean	S.D.	25th perc.	Median	75th perc.	Observations
τ	31.77	5.08	28.00	33.00	35.00	134
m^i	35.86	14.13	25.00	32.50	48.00	134
m^d	31.99	15.65	25.00	30.00	45.00	134
s	11.65	15.81	0.00	0.00	29.00	134
c	26.88	13.60	20.00	27.00	35.00	134
z	21.91	9.67	20.00	25.00	28.00	134
i	3.69	1.63	2.36	3.45	4.26	134
ϕ	18.84	6.62	15.00	20.00	20.00	134
π	2.05	1.07	1.30	2.00	2.60	134
p	41.33	19.46	30.15	36.00	47.10	320